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& ASSOCIATES

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April 17, 2008 Reference No. 027545-00

Mr. Philip Allen
Remedial Project Manager
United States Environmental Protection Agency
6PD
1445 Ross Avenue
Dallas, Texas 75202

Dear Mr. Allen:

Re: Submittal of the April 17, 2008 Errata Sheet to the
Revised Draft Tier 1 Remedial Investigation Report
Star Lake Canal Superfund Site
Jefferson County , Texas
CERCLA DOCKET NO. 06-02-06

On behalf of Chevron Environmental Management Company (CEMC) and Huntsman Petrochemical Corporation (Huntsman), Conestoga Rovers & Associates (CRA) and ENTRIX Environmental Consultants (ENTRIX) submit herein the April 17, 2008 errata sheet for the Revised Draft Tier 1 Remedial Investigation (RI) Report that was submitted to the US Environmental Protection Agency (EPA), the Texas Commission on Environmental Quality (TCEQ), and other trustees on February 22, 2008. An errata sheet dated March 19, 2008 was previously submitted. The Revised Draft Tier 1 RI Report should be accompanied by both errata sheets with the following corrections:

- Revised Table of Contents (11 pages);
- Revised Section 2.7.1 (1 page, page 17);
- Revised Section 7.2 (1 page, page 53);
- Revised Section 8.1.3 (1 page, page 64);
- Revised Section 8.2.4 (1 page, page 78);
- Revised Section 8.4.1.7 (1 page, page 85);
- Figure 7-2' (new figure);
- Figure 8-2' (new figure);
- Appendix I (replace former Appendix I in its entirety, 136 pages); and

- Appendix I Table showing Toxicity Reference Values (TRVs), standard uncertainty factors, rationale, and source documentation (new table, 15 pages).

Each revised page has a header that indicates "ERRATA-MODIFIED APRIL 17, 2008." Each page should replace the existing page in the Revised Draft Tier 1 RI Report. New pages/figures are identified with a header or title that includes "April 17, 2008."

Pursuant to direction received from Mr. Philip Allen of EPA, CRA will forward the materials cited herein on disk separately. If you have any questions, please contact CRA.

Yours truly,

CONESTOGA-ROVERS & ASSOCIATES

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SUPERFUND DIV.
REMEDIAL BRANCH
(6SF-R)

April 18, 2008

Reference No. 027545-00

Mr. Philip Allen
Remedial Project Manager
United States Environmental Protection Agency
6PD
1445 Ross Avenue
Dallas, Texas 75202

Dear Mr. Allen:

Re: Submittal of the CD containing electronic files of the
April 17, 2008 Errata Sheet to the Revised Draft Tier 1 Remedial Investigation Report
Star Lake Canal Superfund Site
Jefferson County , Texas
CERCLA DOCKET NO. 06-02-06

Pursuant to direction received from Mr. Philip Allen of the United States Environmental Protection Agency (EPA), Conestoga-Rovers & Associates (CRA), on behalf of Chevron Environmental Management Company (CEMC) and Huntsman Petrochemical Corporation (Huntsman), submits a CD with the electronic files cited herein.

- Revised Table of Contents (11 pages);
- Revised Section 2.7.1 (1 page, page 17);
- Revised Section 7.2 (1 page, page 53);
- Revised Section 8.1.3 (1 page, page 64);
- Revised Section 8.2.4 (1 page, page 78);
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- Figure 7-2' (new figure);
- Figure 8-2' (new figure);
- Appendix I (replace former Appendix I in its entirety, 136 pages); and
- Appendix I Table showing Toxicity Reference Values (TRVs), standard uncertainty factors, rationale, and source documentation (new table, 15 pages).

Please contact Gary Jacobson at (713) 432-2636 or CRA for more information.

Yours truly,

CONESTOGA-ROVERS & ASSOCIATES

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groundwater for drinking in this area. The Gulf Coast/Chicot Aquifer overlies deeper aquifers in Pliocene sediments. The deeper aquifers in this area contain saltwater.

Based on a registered well search, public supply wells do not exist within a three-mile radius of the Site. One stock well was identified within a one-mile radius of the Site. Drinking water in the area is supplied by the Lower Neches Valley Authority (LNVA) whose surface water intake points are north and upstream of the Site, in the City of Beaumont, Texas. The groundwater resource is identified in Section 9.1.

2.7.2 HUMAN USE OF THE BAYOU

Based on the TNRCC (presently TCEQ), ESI there are no surface water uses and no drinking water intakes in the study area. The canals are used by some of the surrounding industry to receive permitted discharge of effluent. There exists a potential for area residents to use portions of the bayou for recreational purposes. In addition, it has been observed that recreational fishing and bait fishing has occurred within Star Lake Canal.

2.8 ECOLOGICAL SETTING

Based on topographic maps, aerial photos and site reconnaissance, a large portion of the Star Lake Canal watershed is dominated by commercial and industrial land use. The primary habitat at the Site appears to be open water canals and bayous bordered by submergent wetlands. The emergent wetlands appear to be dominated largely by *Phragmites*, *Juncus*, and *Spartina* vegetation. Unconsolidated sediments appear to comprise the bottom of Star Lake Canal and Jefferson Canal, as well as portions of Gulf States Utility Canal and Molasses Bayou.

2.9 ARCHAEOLOGICAL RESOURCES

In an attempt to determine if there are records of historical or archaeological sites within the boundary of the Site, a letter was submitted to the Texas Historical Commission (THC) on June 14, 2006 requesting a review of records maintained by the THC.

In written correspondence dated July 14, 2006, the THC recommended an archaeological survey be conducted at the Site prior to ground disturbance to determine if any archaeological sites were present at the Site. In written correspondence dated

Site-specific concentrations of TOC from surface sediment data are listed in Table 5-3A through Table 5-3D. The mean concentration of the upper six inches of sediment was used.

No site-specific lipid concentrations for finfish or shellfish are available. The lipid concentration value for the equation was chosen from ERDC-WES for finfish and shellfish concentrations. The value chosen was the average value of freshwater crustacea, saltwater crustacea, bottom feeding fish and mid-level feeding fish, rounded up to 5 percent.

The BSAF used to develop the PCLs were based on reported values from the U.S. Army Engineer Research and Development Center-Waterways Equipment Section (ERDC-WES). No site-specific BSAF values are available. BSAF values were selected from the ERDC-WES as of February, 2008. Rounded chemical-specific benthic field BSAF values were used for the following constituent groups: PCBs, pesticides, and the general BSAF was used for metals.

7.2 SUMMARY OF EXCEEDANCES

A summary of constituents that had detected concentrations that exceeded the LHHC and their sample locations are summarized below, shown on Figure 7-2, and listed on Table 7-2 through Table 7-4. A summary of human health hazard ratios greater than one is shown on Figure 7-2'. The maximum observed concentrations (MOCs) of constituents that were detected above the LHHC in surface water, sediment, and soil are presented on Tables 7-5A through 7-5C, respectively.

7.2.1 STAR LAKE CANAL

SURFACE WATER

Surface water samples were collected at eight locations, SLC-1 through SLC-5 and SLC-7 through SLC-9, in Star Lake Canal. Star Lake Canal surface water sample results compared to the LHHC are shown on Table 5-1A. Sample results that exceeded the LHHC are shown on Table 7-2 and summarized below.

Metals

Dissolved manganese concentrations exceeded the LHHC in surface water samples SLC-2 through SLC-5. Total manganese concentrations exceeded the LHHC in surface water samples SLC-1 through SLC-5.

8.1.3 SELECTION OF COPECS

Selection of COPECs was based on the concentrations of constituents measured in sediment, surface water, and soil from the Site using the following criteria:

1. If a constituent was not detected (i.e., < laboratory sample quantitation limit [SQL]) in *any* sample, it was not further considered a COPEC for risk assessment purposes. If a PAH was detected above a respective benchmark, then all PAHs were retained for risk assessment purposes;
2. If a constituent was detected in at least one sample *and* the constituent was bioaccumulative, it was considered a COPEC. A bioaccumulative organic constituent is characterized by a log[K_{OW}] ≥ 4.0. Several inorganic constituents (e.g., methyl mercury [MeHg]) are also considered bioaccumulative;
3. If a constituent was detected (i.e., ≥ laboratory sample quantitation limit [SQL]) in at least 5 percent of samples collected from a *specific* environmental medium, it was considered a possible COPEC in that medium;
4. If criterion (3) was satisfied and no ecological screening benchmark was available for a constituent it was considered a COPEC for risk assessment purposes; and
5. If a criterion (3) was satisfied and the maximum concentration of a constituent exceeded its media-specific ecological screening benchmark, it was considered a COPEC for risk assessment purposes.

Detected concentrations of COPECs that exceeded their respective ecological benchmark are shown on Figure 8-2. A summary of ecological hazard ratios greater than one is shown on Figure 8-2'. The maximum detected concentrations, associated screening benchmarks, and hazard ratios of constituents in surface water, sediment, and soil are presented in Tables 8-7A through 8-7C, respectively. These tables indicate constituents qualifying as COPECs and the specific retention criteria that were met for consideration as a COPEC.

8.1.3.1 SURFACE WATER RESULTS

A total of 118 constituents analyzed in surface water had a corresponding ecological benchmark in freshwater and 81 constituents had a corresponding ecological benchmark in marine water. Seventeen constituents were detected in surface water samples above their corresponding ecological benchmark in at least one sample. Constituents detected above their respective ecological benchmarks include 1 VOC, 2 SVOCs, 4 PAHs, 4 pesticides, 4 total metals, and 2 dissolved metals and are summarized on Table 8-4. A total of 75 constituents were retained as COPECs in surface water based on the criteria

Fishbein (1985) observed interspecies sensitivities of ≤5.0 for both human:mouse and human:rat. Because of the vast phylogenetic differences between species from the three mammalian studies, an uncertainty factor of a UF equal to 5.0 is acceptable to account for inter-species extrapolation for receptors used in this study. In this SLERA, a UF equal to 10.0 was used to account for inter-taxon variability within the same taxonomic class; a UF equal to 100.0 was used to account for inter-taxon variability between different taxonomic classes.

The compiled toxicological dose-response information provides quantitative information about the concentration that causes documented effects on each receptor. This information was obtained using a comprehensive literature search and review of USEPA, USFWS, chemical manufacturers, and other public and private data. The NOAEL-based TRV values and UF values used in the SLERA are summarized in Appendix I and listed on Appendix I Table.

8.3 RISK CHARACTERIZATION

Risk to ROCs was characterized by comparison of estimated total daily dose to estimated effects (i.e., TRVs) or in the case of invertebrates and aquatic receptors, to the appropriate soil, sediment or aquatic ecological benchmark. Hazard quotients (HQs) and hazard ratios (H) for each COPEC-ROC pair for the Site were calculated and models are provided in Appendix J. HQs were determined using conservative NOAEL-based TRVs. A HQ < 1 indicates that risk is acceptable (USEPA 1998). Alternatively, a HQ ≥ 1 indicates potentially unacceptable risk and the need for further investigation. Hazard ratios were determined by a comparison of the maximum concentration of COPECs in sediment, soil, and surface water to their respective benchmarks. An H value ≥1 indicates the likelihood of potential toxicity/risk to the receptor group and the need for further investigation.

8.3.1 HAZARD QUOTIENTS AND HAZARD RATIOS

Hazard quotients (HQ) and hazard ratios (H) corresponding to the ratio of total daily dose to effects represented by the appropriate TRV or benchmark were calculated using the following relationships:

organisms that likely utilize the Site 100 percent of the time, these values may not change. In subsequent investigations, SUF will be adjusted for actual time specific ROCs might actually utilize the site. This adjustment will result in more realistic predictions of risk constituents pose to site ROCs.

8.4.1.7 BIOACCUMULATION FACTORS

Where available, literature derived bioaccumulation factors for each constituent-ROC combination were used. For this SLERA, a BAF of 1.0 was used for each PAH, as well as non-bioaccumulating compounds without cited BAF values. However, based on investigations that have been previously conducted, it is known that for some receptors a BAF less than 1 is appropriate. In some cases, the use of BAF values of 1.0 will result in a greater predicted or modeled body burden to receptors than would be expected. As a result, risk estimates are likely overestimated. A more detailed review of the literature will likely result in more accurate BAFs that can be utilized and result in more accurate predictions of body burden.

8.4.1.8 SPATIAL HETEROGENEITY OF CONSTITUENTS

The concentrations of constituents at the Site vary substantially. Use of the maximum concentration over-estimates exposure to the mobile receptors in this study. In addition, most organisms will not be exposed to maximum concentrations at the Site. A more realistic estimate of the concentrations of constituents that organisms are exposed to will provide a better estimate of potential risk to upper trophic level receptors.

8.5 SUMMARY AND CONCLUSIONS

Statistical summaries of the constituents for the total samples collected in the respective media for surface water, sediment, and soil are listed on Tables 8-12A through 8-12C. Statistical summaries of constituents for samples collected in each AOI for surface water, sediment, and soil are listed in Tables 8-13A through 8-13I. Tables 8-7A through 8-7C summarize all constituents in each respective media and provide a reason for their retention or elimination as a COPEC.

LEGEND

- SURFACE SEDIMENT SAMPLE
- SURFACE WATER SAMPLE
- SURFACE MID AND REFUSAL DEPTH SEDIMENT SAMPLE
- BANK SOIL SAMPLE
- PIEZOMETER LOCATION
- STAFF GAGE LOCATION

0 200 500ft

Matrix	Constituent Name	Limiting Human Health Criteria
Soil	Arsenic	1.8
Soil	Beryllium	0.92
Soil	Lead	1.5
Soil	Mercury	0.0039
Soil	Silver	0.71
Soil	Benzo(a)pyrene	0.23
Soil	Dieldrin	0.055
Soil	gamma-BHC (Lindane)	0.0046
Soil	Pentachlorophenol	0.0092

Matrix	Constituent Name	[a]	[b]	[c]
Sediment	Copper	189	126	21000
Sediment	Mercury	1.4	0.95	34
Sediment	Benzo(a)anthracene	-	-	16
Sediment	Benzo(a)pyrene	-	-	1.6
Sediment	Benzo(b)fluoranthene	-	-	16
Sediment	Dibenz(a,h)anthracene	-	-	1.6
Sediment	PCB-1242	0.021	0.014	2.3
Sediment	PCB-1248	0.021	0.014	2.3
Sediment	PCB-1254	0.021	0.014	2.3
Sediment	PCB-1260	0.021	0.014	2.3
Sediment	4,4-DDE	0.058	0.039	87
Sediment	Aldrin	0.0012	0.00078	0.84
Sediment	Dieldrin	0.0012	0.00083	0.89
Sediment	Heptachlor	0.0044	0.0029	3.2
Sediment	Heptachlor epoxide	0.0022	0.0015	1.6
Sediment	>C12 - C28 Hydrocarbons	-	-	3700
Sediment	Total C6 - C35 Hydrocarbons	-	-	3700
Sediment	Pentachlorophenol	0.39	0.26	56

Matrix	Constituent Name	[d]	[e]	[f]
Surface Water	Manganese	0.1	0.1	40.9
Surface Water	Manganese (Dissolved)	0.1	0.1	40.9
Surface Water	Mercury	0.0000122	0.000025	0.0973
Surface Water	Benzo(a)anthracene	0.00081	0.00054	-
Surface Water	Benzo(a)pyrene	0.00081	0.00054	-
Surface Water	Benzo(b)fluoranthene	0.00018	0.00018	-
Surface Water	Dibenz(a,h)anthracene	0.00018	0.00018	-
Surface Water	Indeno(1,2,3-cd)pyrene	0.00018	0.00018	-
Surface Water	4,4-DDE	0.000007	0.000005	-
Surface Water	Aldrin	0.00000426	0.0000028	-
Surface Water	Dieldrin	0.000002	0.000001	-
Surface Water	Heptachlor	0.00000265	0.00000177	-
Surface Water	bis(2-Chloroethyl)ether	0.0053	0.0053	0.0258
Surface Water	bis(2-Chloroisopropyl)ether	65	65	0.181
Surface Water	Pentachlorophenol	0.135	0.09	0.00992
Surface Water	1,2-Dichloropropane	0.15	0.15	0.186
Surface Water	Carbon tetrachloride	0.0084	0.0056	0.103

NOTES:

Sample locations SLC-1 through SLC-7, JC-1, GSUC-1 through GSUC-3, MB-1, MB-4, MB-6, MB-10, MB-13, MB-14, MB-18, MB-21, MB-24, MB-27 through MB-29, and MB-32 are considered characteristically saltwater

Sample locations SLC-8, SLC-9, and JC-2 through JC-7 are considered characteristically freshwater

Soil Limiting Human Health Criteria based on TRRP Tier 1soil PCLs and EPA Region 6 Medium-Specific Screening Levels (MSSLs)

a - Human Health Standard based on TCEQ TRRP sediment protective of ingestion of freshwater fish/shellfish. This standard is only applicable to surface sediments

b - Human Health Standard based on TCEQ TRRP sediment protective of human ingestion of saltwater fish/shellfish. This standard is only applicable to surface sediments

c - Human Health Standard based on TCEQ TRRP Tier 1 Sediment Protective Concentration Levels (PCLs) for sediment ingestion and dermal contact.

d - Human Health Surface Water Risk-Based Exposure Limit (RBEL) for Ingestion of Freshwater Fish

e - Human Health Surface Water Risk-Based Exposure Limit (RBEL) for Ingestion of Saltwater Fish

f - Tier 1 Direct Human Contact Recreation Water Protective Concentration Level (PCL)

Surface- Sample represents the approximate top 6 inches of the sediment core

Mid – Sample represents the approximate 6 to 12 inches of the sediment core

Refusal – Sample represents the approximate 12 to 18 inches of the sediment core

Sediment and soil criteria reported in mg/kg, and surface water criteria reported in mg/L.

Hazard Ratios (rounded to two significant figures) were calculated by dividing reported detections by the applicable Limiting Human Health Criteria.

Only Hazard Ratios greater than one are shown.

VOCs – Volatile organic compounds
SVOCs – Semi-volatile organic compounds
TPH – Total petroleum hydrocarbons
PCBs – Polychlorinated biphenyls
PAH – Polycyclic aromatic hydrocarbons
- Not Applicable

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

SUMMARY OF HUMAN HEALTH HAZARD RATIOS GREATER THAN ONE APRIL 17, 2008

STAR LAKE CANAL SUPERFUND SITE

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

RE: AERIAL PHOTOGRAPH, DATED NOVEMBER 2005.

Project Manager:	Reviewed By:	Date: 04/10/08	
Scale: 1"=500'	Project Nº: 027545-00	Report Nº: 005	Figure Nº: 7-2

027545-00(005)GN-BR027 APR 10/2008

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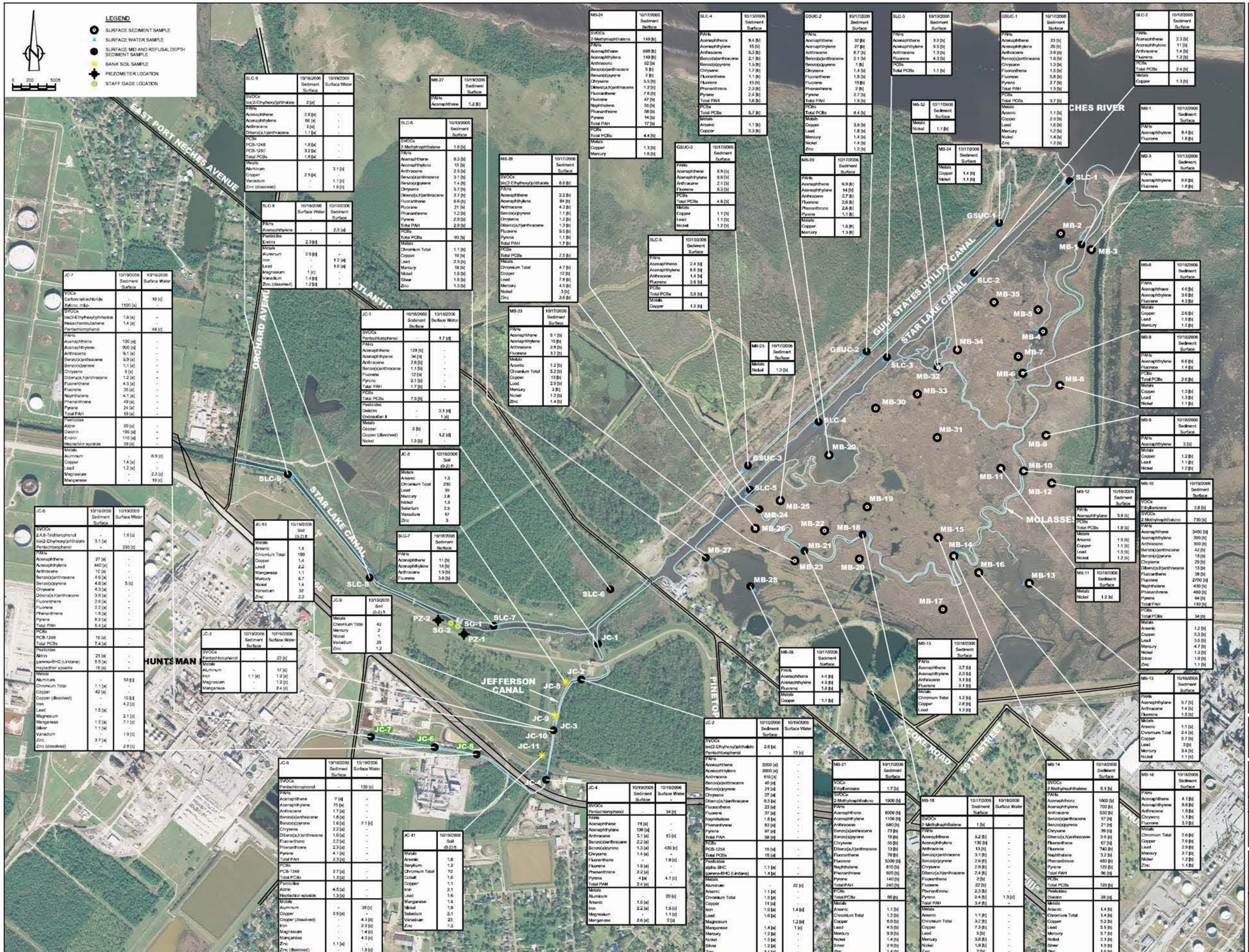

Matrix	Constituent Name	Soil Ecological Benchmark
Soil	Arsenic	5.9
Soil	Beryllium	1.5
Soil	Chromium Total	0.4
Soil	Cobalt	7
Soil	Copper	15
Soil	Iron	15000
Soil	Lead	15
Soil	Manganese	300
Soil	Mercury	0.04
Soil	Nickel	10
Soil	Selenium	0.3
Soil	Vanadium	2
Soil	Zinc	30

Matrix	Constituent Name	[a]	[b]
Sediment	Arsenic	9.79	8.2
Sediment	Chromium Total	43.4	81
Sediment	Copper	31.6	34
Sediment	Iron	20000	
Sediment	Lead	35.8	46.7
Sediment	Manganese	460	
Sediment	Mercury	0.18	0.15
Sediment	Nickel	22.7	20.9
Sediment	Silver	1	1
Sediment	Zinc	121	150
Sediment	Acenaphthene	0.0067	0.016
Sediment	Acenaphthylene	0.0059	0.044
Sediment	Anthracene	0.0572	0.0853
Sediment	Benzo(a)anthracene	0.108	0.261
Sediment	Benzo(a)pyrene	0.15	0.43
Sediment	Chrysene	0.166	0.384
Sediment	Dibenz(a,h)anthracene	0.033	0.0634
Sediment	Fluoranthene	0.423	0.6
Sediment	Fluorene	0.0774	0.019
Sediment	Naphthalene	0.176	0.16
Sediment	Phenanthrene	0.204	0.24
Sediment	Pyrene	0.195	0.665
Sediment	PCB-1248	0.03	
Sediment	PCB-1254	0.06	
Sediment	PCB-1260	0.005	
Sediment	Aldrin	0.002	
Sediment	alpha-BHC	0.006	
Sediment	Dieldrin	0.0019	0.000715
Sediment	Endrin	0.00222	
Sediment	gamma-BHC (Lindane)	0.00237	0.00032
Sediment	Heptachlor epoxide	0.00247	
Sediment	2-Methylnaphthalene		0.07
Sediment	bis(2-Ethylhexyl)phthalate	0.182	0.182
Sediment	Hexachlorobutadiene	0.055	0.02
Sediment	Ethylbenzene	2.66	0.65
Sediment	Xylene, m&p-	0.0046	

Matrix	Constituent Name	[c]	[d]
Surface Water	Aluminum	0.087	
Surface Water	Copper (dissolved)	0.007	0.0036
Surface Water	Iron	1	
Surface Water	Magnesium	3.23	
Surface Water	Manganese	0.12	
Surface Water	Vanadium	0.02	
Surface Water	Zinc (dissolved)	0.0581	0.0842
Surface Water	Anthracene	0.0003	0.00018
Surface Water	Benzo(a)pyrene	0.000014	
Surface Water	Fluoranthene	0.00616	0.00296
Surface Water	Pyrene	0.007	0.00024
Surface Water	Dieldrin	0.000002	0.000002
Surface Water	Endosulfan II	0.000056	0.000009
Surface Water	Endrin	0.000002	0.000002
Surface Water	2,4,6-Trichlorophenol	0.0135	0.061
Surface Water	Pentachlorophenol	0.0021	0.0098
Surface Water	Carbon tetrachloride	0.0098	1.5

NOTES:

Sample locations SLC-1 through SLC-7, JC-1, GSUC-1 through GSUC-3, MB-1, MB-4, MB-6, MB-10, MB-13, MB-14, MB-18, MB-21, MB-24, MB-27 through MB-29, and MB-32 are considered characteristically saltwater

Sample locations SLC-8, SLC-9, and JC-2 through JC-7 are considered characteristically freshwater

Soil ecological benchmark selected from Table 3-4 in TCEQ TRRP RG-263

a - Freshwater Sediment ecological benchmarks (applicable to surface sediment only) selected from Table 3-3 in TCEQ TRRP RG-263

b - Saltwater Sediment ecological benchmarks (applicable to surface sediment only) selected from Table 3-3 in TTCEQ TRRP RG-263

c – Fresh surface water ecological benchmark selected from Table 3-2 in TCEQ TRRP RG-263, Revised 2006

d – Salt surface water ecological benchmark selected from Table 3-2 in TCEQ TRRP RG-263, Revised 2006

Surface- Sample represents the approximate top 6 inches of the sediment core

Mid – Sample represents the approximate 6 to 12 inches of the sediment core

Refusal – Sample represents the approximate 12 to 18 inches of the sediment core

Sediment and soil benchmarks reported in mg/kg, and surface water benchmarks reported in mg/L

Hazard Ratios (rounded to two significant figures) were calculated by dividing reported detections by the applicable Ecological Benchmark.

Only Hazard Ratios greater than one are shown.

VOCs – Volatile organic compounds
SVOCs – Semi-volatile organic compounds
TPH – Total petroleum hydrocarbons
PCBs – Polychlorinated biphenyls
PAH – Polycyclic aromatic hydrocarbons
- Not Applicable

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

SUMMARY OF ECOLOGICAL HAZARD RATIOS GREATER THAN ONE
APRIL 17, 2008

STAR LAKE CANAL
SUPERFUND SITE

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
RE: AERIAL PHOTOGRAPH, DATED NOVEMBER 2005

Project Manager:	Reviewed By:	Date: 04/10/08	
Scale: 1"=500'	Project No: 027545-00	Report No: 005	Figure No: 8-2

027545-00(005)GN-BR028 APR 15/2008

APPENDIX I

NOAEL-BASED TOXICITY REFERENCE VALUES

ALUMINUM (Al)

Small Mammals: TRV = 19.0 mg/Kg-bw/day

This TRV was based on a 390 day (3 generations) NOAEL of 19 mg/Kg-bw/day for mice (Ondreicka et al. 1966). At this dose, no adverse effects were observed with respect to total numbers of litters or number of offspring produced. Although reduced weight gain was observed at the TRV, no adverse effects on reproduction were observed. This study was the only one found where relevant population-based effects (reproductive success) were examined. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals: TRV = 60.0 mg/Kg-bw/day

This TRV was based on a 6 month NOAEL of 60 mg/Kg-bw/day for dogs (ATSDR 1990). At this dose, no adverse histopathological, cardiovascular, hepatic, renal, gastrointestinal, and hematological effects were observed. This was the only study found that examined aluminum effects on medium mammals. **Used this number for the Raccoon and Muskrat. Used this number for the Painted Turtle with a UF of 100 based on reptilian/mammalian variability.**

Chickens/Pheasants and Turkeys: TRV = 73.6 mg/Kg-bw/day

This TRV was based on a 4 month NOAEL for ringed turtledoves of 73.6 mg/Kg-bw/day exposed to aluminum sulphate (Carriere et al. 1985). Various reproductive endpoints were examined for signs of adverse effects. The 566 mg Al/Kg in the diet was multiplied by the average daily ingestion rate of doves (0.013 Kg/d; Nagy, 1987) and then divided by the average weight of turtle doves (0.1 Kg; mourning doves used as a surrogate; Terres, 1982) to obtain a TRV of 73.6 mg/Kg-bw/day. **Used this value for Green Heron, Mallard, Brown Pelican, Wood Stork, Reddish Egret and White-faced Ibis. Used this value for the Spotted Sandpiper with a UF of 10 based on inter-taxon variability.**

Passerine Birds: TRV = 1.11 mg/Kg-bw/day

This TRV was based on a single oral dose LC_{50} for red-winged blackbird of >111 mg/Kg-bw exposed to aluminum (Schafer et al. 1983). A single oral dose LC_{50} for house sparrow of >250 mg/Kg-bw exposed to aluminum was also found (Schafer et al. 1983). The value of 111 mg/Kg-bw for red-winged blackbird was divided by a UF = 100 to estimate a chronic NOAEL, resulting in a TRV of 1.11 mg/Kg-bw/day. **Used this value for the Belted Kingfisher, American Robin, and Marsh Wren.**

ANTIMONY

Small Mammals: TRV = 0.35 mg/Kg-bw/day

This TRV was based on a full life cycle NOAEL value (30 month) found for mice of 0.35 mg/Kg-bw/day (Schroeder et al. 1968). At the reported dose, significant effects on female mouse life span (30-month life span reduced by 49-86 days) and growth on both males and females (5-13% reduction in body weight) were observed. However, no effects on male life span and male and female mouse survival or longevity were reported. **Used for Short-tailed Shrew. Used this number for the Painted Turtle, Bullfrog, Marsh Wren, American Robin, Mallard, Green Heron, Reddish Egret, Wood Stork, Spotted Sandpiper, Belted Kingfisher and White-Faced Ibis with a UF of 100 based on reptilian/mammalian, amphibian/mammalian and avian/mammalian variability.**

Medium Mammals: TRV = 0.84 mg/Kg-bw/day

This TRV was based on a 32 day NOAEL of 84 mg/Kg-bw/day for dogs (ATSDR, 1990). The endpoint was severe diarrhea. Weight loss and muscle weakness of dogs was observed at a much higher concentration of 6644 mg/Kg-bw/day (LOAEL). The 32-day NOAEL of 84 mg/Kg-bw/day was divided by 10 to account for uncertainty and further divided by 10 to **estimate** a chronic NOAEL, resulting in a TRV of 0.84 mg/Kg-bw/day. **Used this value for the muskrat and raccoon. Used this value with a UF of 100 for Brown Pelican.**

Deer: TRV = 2.0 mg/kg-bw/day

This TRV was based on a 155 day NOAEL of 2.0 mg/Kg-bw/day for sheep (James et al. 1966). The NOAEL was based on birth defects in lambs from ewes dosed during gestation.

All Birds (Not Determined)

No data were found regarding bird exposure to antimony.

ARSENIC (As)

Medium Mammals: TRV = 2.35 mg/Kg-bw/day

This TRV was based on a 2 year NOAEL of 2.35 mg/Kg-bw/day for dogs dosed with sodium asenite (+3) or sodium arsenate (+5) via the diet (Byron et al. 1967). The NOAEL was based on survival and growth of beagle dogs. The dietary dose of 50 mg/Kg was multiplied by the estimated ingestion rate of 0.39 Kg/d (Nagy 1987) and then divided by the estimated weight of a beagle dog (8.3 Kg; Gralla et al. 1977) to obtain 2.35 mg/Kg-bw/day**. Used this value for Short-tailed Shrew with a UF of 10 based on inter-taxon variability. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability. Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle with a UF of 100 based on reptilian/mammalian variability.**

Deer: TRV = 0.10 mg/kg-bw/day

This TRV was based on a 45-147 day NOAEL of 0.5 mg/Kg-bw/day for pregnant ewes dosed with potassium arsenite in gelatin capsules (James et al. 1966). The endpoint was general toxicity effects on the offspring. The value for sheep was divided by 5 to estimate a chronic NOAEL of 0.10 mg/Kg-bw/day for deer.

Turkey: TRV = 0.035 mg/Kg-bw/day

A single oral dose value for turkey of 17.4 mg/Kg-bw/day exposed to 3-nitro-4-hydroxy phenylarsonic acid was the only value found for turkey (Eisler, 1988). The turkey value of 17.4 mg/Kg-bw/day was divided by 500 to estimate a chronic NOAEL. *This TRV appears conservative based on other values obtained from other species from the same order* (Galliformes; see below).

Chicken/Pheasant: TRV = 1.12 mg/Kg-bw/day

This TRV was based on a 9 wk NOAEL of 1.52 mg/Kg-bw/day for domestic chickens dosed with 3-nitro-4-hydroxy phenylarsonic acid in the diet (Eisler, 2000). The value reported in Eisler (1988) as 187 mg/Kg dry feed was multiplied by the amount of dry feed consumed daily by a domestic hen (3.4% of total body weight; Welty, 1982; page 113) and divided by the weight of an adult domestic hen (4 lb or 1.8 Kg; Welty, 1982) to yield a TRV of 3.53 mg/Kg-bw/day. This value was divided by 3 to estimate a chronic NOAEL of 1.12 mg/Kg-bw/day.

Ducks: TRV = 4.67 mg/Kg-bw/day

This TRV was based on an 8 wk NOAEL of 14.0 mg/Kg-bw/day for mallard ducklings fed sodium arsenate (Stanley et al. 1994). The LOAEL was based on a variety of reproductive and growth endpoints for adults and offspring. The dietary level of 100 mg As/Kg was multiplied by the feed consumption rate of adult mallards (0.14 Kg/d; Camardese et al. 1990) and then divided by the body weight of adult mallards (1.0 Kg; Camardese et al. 1990) to yield 14.0 mg/Kg-bw/day. This value was divided by 3 to estimate a chronic exposure, resulting in a TRV of 4.67 mg/Kg-bw/day. **Used this value for the Mallard.**

Songbirds: TRV = 7.33 mg/Kg-bw/day

This TRV was based on a 6 month NOAEL of 7.33 mg/Kg-bw/day for brown-headed cowbirds exposed to copper acetoarsenite (Eisler, 2000). The endpoint was survival. The value reported in Eisler (2000) as 33 mg/kg dry feed was multiplied by the estimated amount of dry feed consumed daily by cowbirds (0.012 Kg/d; Nagy 1987) and divided by the weight of an adult brown-headed cowbird (0.054 Kg; Welty, 1982) to yield a TRV of 7.33 mg/Kg-bw/day. **Used this value for the Marsh Wren, American Robin, and Belted Kingfisher.**

Herons and Other Waterbirds: TRV = 0.93 mg/Kg-bw/day

No data were found regarding waterbird exposure to arsenic. This TRV was based on the duck TRV of 4.67 mg/Kg-bw/day as it was the most credible study found for birds that reported reproductive endpoints. The duck TRV of 4.67 mg/Kg-bw/day was divided by 5 to account for inter-taxon variability, resulting in a TRV of 0.93 mg/Kg-bw/day. **Used this value for the Spotted Sandpiper, Green Heron, White-faced Ibis, Wood Stork, Reddish Egret and the Brown Pelican.**

Raptors: TRV = 0.93 mg/Kg-bw/day

No data were found regarding raptor exposure to arsenic. The duck TRV was used to extrapolate this TRV because it was the most rigorous avian exposure found. The raptor TRV was extrapolated from the duck TRV of 4.67 mgKkg-bw/day by dividing by 5 to account for inter-taxon variability, resulting in a TRV of 0.93 mg/Kg-bw/day.

BARIUM (Ba)

Small Mammals: TRV = 63.5 mg/Kg-bw/day

The NOAEL value was based on a 92 day NOAEL of 63.5 mg/Kg-bw/day) for rats exposed to barium chloride in drinking water (Dietz et al. 1992). The NOAEL was based on growth. The authors also reported a mouse growth NOAEL of 115.8 mg/Kg-bw/day. *This value should be considered conservative because reproductive success, fertility, and survival were not adversely affected at either the NOAEL or LOAEL doses for both rats and mice.* **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100, based on amphibian/mammalian variability.**

Medium and Large Mammals: TRV = 6.0 mg/Kg-bw/day

The LOAEL value was based on an acute oral LD_{5O} of 90 mg/Kg-bw for dogs exposed to barium chloride (Sax 1984). The LD_{5O} dose was the lowest dose tested producing a lethal effect. The LD_{5O} was divided by 3 to estimate a chronic LOAEL, resulting in a chronic LOAEL of 30.0 mg/Kg-bw/day. The LOAEL was further divided by 5 to estimate a NOAEL TRV of 6.0 mg/Kg-bw/day. No other data were found. **Used this value for the Raccoon, and Muskrat. Used this value for the Painted Turtle with a UF of 100 for reptilian/mammalian variability.**

Chickens: TRV = 69 mg/kg-bw/day

This TRV was based on a 4 week NOAEL of 208 mg/Kg-bw/day for 1-day old domestic chickens exposed to barium hydroxide in the diet (Sample et al. 1996). The NOAEL was based on survival. The 2,000 mg/Kg value in the diet was multiplied by the estimated daily food consumed (0.0126 Kg/d) and then divided by the estimated body weight of 0.121 Kg to yield 208 mg/Kg-bw/day. This value was divided by 3 to estimate a chronic NOAEL, yielding a TRV of 69 mg/Kg-bw/day.

Ducks, Herons, Etc: TRV = 13.9 mg/Kg-bw/day

No data were found regarding barium exposure to water birds. This value was based on a 4 week NOAEL of 208 mg/Kg-bw/day for 1-day old domestic chickens exposed to barium hydroxide in the diet (Sample et al. 1996). The NOAEL was based on survival. The 2,000 mg/Kg value in the diet was multiplied by the estimated daily food consumed (0.0126 Kg/d) and then divided by the estimated body weight of 0.121 Kg to yield 208 mg/Kg-bw/day. This value was divided by 3 to estimate a chronic NOAEL and further divided by 5 to extrapolate across taxa, yielding a TRV of 13.9 mg/Kg-bw/day. **Used this value for the Mallard, Belted Kingfisher, Green Heron, White-faced Ibis, Marsh Wren, American Robin, Wood Stork, Reddish Egret and the Brown Pelican.**

BERYLLIUM (Be)

Small Mammals: TRV = 25.8 mg/Kg-bw/day

This TRV was based on a 2 year NOAEL of 25.8 mg/Kg-bw/day for rats exposed to beryllium sulfate in the diet. Adverse effects were not observed on reproduction or lactation, nor was the compound teratogenic or mutagenic. The value reported in Morgareidge et al. (1977) as 500 mg/Kg feed was multiplied by the amount of dry feed consumed daily by rats (0.015 Kg/d; Nagy 1987) and divided by the weight of adult rats (0.30 Kg; Schroeder and Mitchener 1975) to yield a TRV of 25.8 mg/Kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium and Large Mammals (Including Deer): TRV = 5.16 mg/Kg-bw/day

No data were found regarding beryllium exposure to medium or large mammals. The medium mammal and deer TRVs were extrapolated from the small mammal TRV was divided by 5 to estimate this TRV. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle with a UF of 100 based on reptilian/mammalian variability. Used this value for the Marsh Wren, Mallard, Green Heron, American Robin, Belted Kingfisher, Brown Pelican, Wood Stork, Reddish Egret and Spotted Sandpiper with a UF of 100 based on aves/mammalia variability.**

All Birds (Not Determined)

No data were found regarding beryllium exposure to birds.

CADMIUM

Small Mammals: TRV = 0.40 mg/Kg-bw/day

This TRV was based on a full lifespan NOAEL (3 year) of 5 mg/Kg (0.40 mg/Kg-bw/day) for mice exposed to cadmium in drinking water (Schroeder et al. 1964). The endpoints were visible signs of toxicity, survival, and longevity. The dietary dose of 5 mg/Kg (via water) was multiplied by the daily water intake of 0.004 L/d and then divided by the weight of an adult mouse (0.05 Kg; Schroeder et al. 1963) to obtain 0.40 mg/Kg-bw/day. **Used this value for the short-tailed shrew. Used this value for the painted turtle and bullfrog with a UF of 100 based on reptilian/mammalian and amphibian/mammalian variability.**

Medium Mammals, Raccoon, Coyote: TRV = 0.49 mg/kg-bw/day

This TRV was based on a 4 yr NOAEL value of 0.49 mg/Kg-bw/day for dogs exposed to cadmium in drinking water (Anwar et al. 1961). The NOAEL was based on survival, growth, feed consumption, and organ weights. The dose calculation was based on the concentration in drinking water (6.1 mg/L) multiplied by the dog drinking rate of 0.66 L/d (Calder and Brown 1983) and then divided by the body weight of 8.3 Kg for beagle dogs (Gralla et al. 1977). **Used this value for raccoon and muskrat.**

Deer: TRV = 0.84 mg/Kg-bw/day

This TRV was based on a 12 week NOAEL value of 0.84 mg/Kg-bw/day for 8 week old cattle exposed to cadmium chloride in feed (Powell et al. 1964). The NOAEL was based on food and water consumption, body weight, and testicular growth. The dose calculation was based on the concentration in feed (40 mg/Kg) multiplied by the ingestion rate (3.43 Kg/d) and then divided by the body weight (163 Kg) as provided by the authors. No other data were found for large mammals.

Ducks: TRV = 1.45 mg/Kg-bw/day

This TRV was based on a 90-day NOAEL for mallard ducks exposed to cadmium chloride in the diet White and Finley (1978). The endpoints were testes weights and number of eggs laid per hen. The NOAEL of 15.2 mg/Kg was multiplied by 0.110 Kg of food eaten daily as reported by the authors and then divided by 1.153 Kg weight for the average mallard exposed in the study to yield 1.45 mg/Kg-bw/day. **Used this value for the Mallard. Used this value for the Brown Pelican with a UF of 10.**

Heron and Pied-Billed Grebe: TRV = 0.29 mg/Kg-bw/day

This TRV was based on the duck TRV of 1.45 mg/Kg-bw/day. The duck TRV of 1.45 mg/Kg-bw/day was divided by 5 to account for inter-taxon variation, resulting in a TRV of 0.29 mg/Kg-bw/day. **Used this value for the Green Heron, Reddish Egret, Wood Stork and White-Faced Ibis.**

Chicken/Pheasant and Turkey: TRV = 0.21 mg/Kg-bw/day

This TRV was based on a 12 week NOAEL of 0.21 mg/Kg-bw/day for domestic chicks exposed to cadmium sulfate in the diet (Leach et al. 1979). The NOAEL was based on egg production. The TRV of 0.21 mg/Kg-bw/day was calculated by multiplying 3 mg/Kg diet by 0.037 Kg of food eaten daily (Nagy, 1987) and then dividing by 0.619 Kg weight of chickens exposed in the study.

Raptors and Passerines: TRV = 0.042 mg/kg-bw/day

No data were found regarding raptor or passerine bird exposure to cadmium. The chicken TRV was used to extrapolate to a raptor TRV because it was the lowest NOAEL found for reproductive effects in birds exposed to cadmium. This TRV was extrapolated from the chicken TRV of 0.21 mg/Kg-bw/day by dividing by 5 to account for inter-taxon variability. **Used this value for the American Robin, Marsh Wren and Belted Kingfisher. Used this value for the Spotted Sandpiper with a UF of 10.**

HEXAVALENT CHROMIUM (Cr^{+6})

Small Mammals: TRV = 6.6 mg/Kg-bw/day

This TRV was based on a LOAEL of 32.7 mg/Kg-bw/day for female rats exposed to potassium dichromate in drinking water for 3 months prior to gestation (Kanojia et al. 1998). The LOAEL was based on various embryo and fetotoxicity endpoints. The dietary dose of 250 mg/L was multiplied by a water ingestion rate of 0.022 L/d and then divided by the body weight of 0.168 Kg supplied by the author to yield 32.7 mg/Kg-bw/day. The LOAEL was divided by 5 to estimate an NOAEL, yielding a TRV of 6.6 mg/Kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium and Large Mammals: TRV = 0.24 mg/Kg-bw/day

This TRV was based on a 4 year NOAEL value of 0.24 mg/Kg-bw/day for dogs exposed to hexavalent chromium (Anwar et al. 1961). The NOAEL was based on survival, growth, feed consumption, and organ weights. The dose calculation was based on the concentration in drinking water (3.0 mg/L) multiplied by the dog drinking rate of 0.66 L/d (Calder and Braun 1983) and then divided by the body weight of 8.3 Kg for beagle dogs (Gralla et al. 1977). **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle with a UF of 100 based on reptilian/mammalian variability.**

Ducks: TRV = 2.71 mg/Kg-bw/day

This TRV was based on a 5 month NOAEL for black ducks exposed to hexavalent chromium reported in Eisler (1986). No effects were observed with respect to survival, reproduction, and blood chemistry at the NOAEL dose. A TRV of 2.71 mg/Kg-bw/day was calculated from the 50 mg Cr/Kg value reported in Eisler (1986) by multiplying by 0.064 Kg of food eaten daily (Nagy, 1987) and then dividing by 2.60 lb (1.18 Kg) weight for an average adult black duck (Terres, 1982). **Used this value for the Mallard.**

Waterbirds: TRV = 0.54 mg/Kg-bw/day

No data were found exposing waterbirds to chromium. This value was based on the duck TRV of 2.71 mg/Kg-bw/day. This value was divided by 5 to account for inter-taxon variation, resulting in a TRV of 0.54 mg/Kg-bw/day. **Used this value for the White-faced Ibis, Green Heron, Brown Pelican, Wood Stork, Reddish Egret and Spotted Sandpiper.**

Chicken/Pheasant and Turkey: TRV = 1.05 mg/Kg-bw/day

This TRV was based on a LOAEL of 5.25 mg/Kg-bw/day for domestic chickens exposed to potassium dichromate (hexavalent chromium) for 32 week in the diet (Asmatullah et al. 1999). The LOAEL was based on body weight, organ weights, hatchability, and eggshell thickness. The value reported by the authors as 250 mg $K_2Cr_2O_7$ kg (88.4 mgCr/Kg) dry feed was multiplied by the amount of dry feed consumed daily by exposed chickens (0.12 Kg/d) and divided by the average weight of exposed chickens (2.02 Kg) to yield 5.25 mg/Kg-bw/day (as Cr^{+6}). This value was divided by 5 to estimate a NOAEL TRV of 1.05 mg/Kg-bw/day.

Raptors and Songbirds: TRV = 0.21 mg/Kg-bw/day

No data were found regarding raptor exposure to chromium. The chicken TRV was used to extrapolate to raptors because it was the best avian exposure to chromium found. The raptor TRV was extrapolated from the chicken TRV of 1.05 mg/Kg-bw/day by dividing by 5 to account for inter-taxon variability. **Used this value for the American Robin, Belted Kingfisher, and Marsh Wren.**

COBALT (Co)

Small Mammals: TRV = 1.67 mg/Kg-bw/day

This TRV was based on a 69 day NOAEL of 5.0 mg/\Kg-bw/day for rats exposed to cobalt chloride via feed (Nation et al. 1983). The NOAEL was based on testicular atrophy and neurobehavioral effects. This value was divided by 3 to estimate a chronic NOAEL of 1.67 mg/Kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value with a UF of 100 for the Bullfrog based on amphibian/mammalian variability.**

Medium Mammals: TRV = 1.67 mg/Kg-bw/day

This TRV was based on a 4 week NOAEL of 5.0 mg/Kg-bw/day for dogs exposed to cobalt chloride via feed (Brewer 1940). The NOAEL was based on an increased red blood cell count. This value was divided by 3 to estimate a chronic NOAEL of 1.67 mg/Kg-bw/day. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle with a UF of 100 based on reptilian/mammalian variability.**

Ducks: TRV = 5.6 mg/Kg-bw/day

This TRV was based on a 4 week NOAEL of 16.7 mg/Kg-bw/day for mallard ducklings fed cobalt chloride (Van Vleet 1982). The NOAEL was based on mortality. The dietary level of 100 mg Co/kg was multiplied by the feed consumption of 4 week-old mallards (0.1 Kg/d; Heinz et al. 1988) and then divided by the body weight of a 4week-old mallard (0.6 Kg) to yield a NOAEL of 16.7 mg/Kg-bw/day. This value was divided by 3 to estimate a chronic NOAEL of 5.6 mg/Kg-bw/day. **Used this value for the Mallard.**

Other Birds: TRV = 1.1 mg/Kg-bw/day

No data were found regarding other bird exposure to cobalt. This TRV was extrapolated from the duck TRV of 5.6 mg/Kg-bw/day by dividing by 5 to account for inter-taxon variability. **Used this value for the Marsh Wren, American Robin, Green Heron, Spotted Sandpiper, Brown Pelican, Wood Stork, Reddish Egret and Belted Kingfisher.**

COPPER (Cu)

Small Mammals: TRV = 8.47 mg/Kg-bw/day

This TRV was based on an 850 day NOAEL of 8.47 mg/Kg-bw/day for mice exposed to copper gluconate in drinking water (Massie and Aiello, 1984). The NOAEL was based on survival time and longevity. The TRV of 8.47 mg/Kg-bw/day was calculated from the 63.5 mg/Kg feed value reported by multiplying by 0.004 L of water ingested daily and then dividing by 0.03 Kg body weight for exposed mice. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals: TRV = 2.85 mg/Kg-bw/day

This TRV was based on a 357 day NOAEL of 2.85 mg/Kg-bw/day for mink (Aulerich et al. 1982). The NOAEL was based on the number of kits whelped, percent kit mortality, kit weight, and litter mass. A TRV of 2.85 mg/Kg-bw/day was calculated from the 50 mg/Kg feed value reported by multiplying by 0.0345 Kg of food eaten daily and then dividing by 0.606 Kg body weight for exposed mink. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle with a UF of 100 based on reptilian/mammalian variability.**

Deer: TRV = 7.7 mg/Kg-bw/day

This TRV was based on an 88 day NOAEL of 7.7 mg/Kg-bw/day for pigs (Kline et al. 1971). The endpoint was body weight gain. A TRV of 7.7 mg/Kg-bw/day was calculated from the 250 mg/Kg feed value by multiplying by 2.83 Kg of food eaten daily and then dividing by 92.3 Kg body weight for exposed pigs (as provided by the authors).

Ground-Feeding Birds: TRV = 18 mg/Kg-bw/day

This TRV was based on a 40 week NOAEL of 18 mg/Kg-bw/day reported for domestic chickens exposed to copper sulfate in the diet (Jackson and Stevenson 1981). The endpoints measured included egg production, egg weight, food intake, body weight, and oviduct and ovary weights. A TRV of 18 mg/Kg-bw/day was calculated from the 300 mg/Kg feed value by multiplying by 0.12 Kg of food eaten daily (authors' data) and then dividing by 2.0 Kg body weight for exposed chickens. **Used this value with UF of 10 for Green Heron, Brown Pelican, and White-faced Ibis.**

Turkey: TRV = 5.6 mg/Kg-bw/day

This TRV was based on a 24 week NOAEL for 1-day old turkey chicks (Kashani et al. 1986). The NOAEL was based on growth. The value reported in Kashani et al. (1986) as 240 mg/Kg dry feed was multiplied by the amount of dry feed consumed daily by a domestic hen (0.317

Kg/d; Nagy 1987) and divided by the weight of turkey chicks at 12 week of age (approximately 13.5 Kg) to yield a TRV of 5.6 mg/Kg-bw/day.

Ducks: TRV = 27.8 mg/Kg-bw/day

This TRV was based on a 4 week NOAEL of 83.3 mg/Kg-bw/day for mallard ducklings fed copper sulfate (Van Vleet 1982). The NOAEL was based on mortality. The dietary level of 500 mg Cu/Kg was multiplied by the feed consumption of 4 week-old mallards (0.1 Kg/d; Heinz et al. 1988) and then divided by the body weight of a 4week-old mallard (0.6 Kg-bw) to yield a NOAEL of 83.3 mg/Kg-bw/day. This value was divided by 3 to estimate a chronic exposure, resulting in a TRV of 27.8 mg/Kg-bw/day. **Used this value for the Mallard. Used this value for the Spotted Sandpiper, White-faced Ibis, Wood Stork, and Reddish Egret with a UF of 10 based on inter-taxon variability.**

Passerine Birds: TRV = 0.50 mg/Kg-bw/day

This TRV was based on a single oral dose LD_{50} of 50 mg/Kg for red-winged blackbirds (Schafer et al. 1983). This value was divided by 100 to estimate a chronic NOAEL, resulting in a TRV of 0.50 mg/Kg-bw/day. **Used this value for the American Robin, Belted Kingfisher, and the Marsh Wren.**

Raptors: TRV = 3.6 mg/Kg-bw/day

No data were found regarding raptor exposure to copper. The chicken TRV was used to extrapolate this TRV because it was the most scientifically sound avian exposure to copper found. The raptor TRV was extrapolated from the chicken TRV of 18 mg/Kg-bw/day by dividing by 5 to account for inter-taxon variability.

CYANIDE (CN)

Small Mammals: TRV = 13.5 mg/Kg-bw/day

This TRV was based on a 11.5 month LOAEL of 67.5 mg KCN/Kg-bw/day for laboratory rats exposed in the diet (Philbrick et al. 1979). The LOAEL was based on significant reductions in body weight and increased thyroid weights. The value reported in Philbrick et al. (1979) as 1,500 mg/Kg feed was multiplied by the amount of dry feed consumed daily by rats (0.018 Kg/d; Nagy 1987) and divided by the weight of adult rats dosed (0.40 Kg) to yield a LOAEL of 67.5 mg/Kg-bw/day. This value was divided by 5 to yield a NOAEL TRV of 13.5 mg/Kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals: TRV = 1.06 mg/Kg-bw/day

This TRV was based on a 15 month NOAEL of 1.06 mg CN/Kg-bw/day (2.0 mg NaCN/Kg-bw/day) for dogs orally exposed to sodium cyanide (Eisler 1991). No measurable adverse effects were observed in test dogs after 15 months of exposure. **Used for Muskrat and Raccoon**. **Used for Painted Turtle with a UF of 100 based on reptilian/mammalian variability.**

Large Mammals: TRV = 0.70 mg/Kg-bw/day

This TRV was based on a 6 month NOAEL of 0.7 mg CN/Kg-bw/day for 5-week old swine orally (via drinking water) exposed to potassium cyanide (Jackson 1988). Effects observed (although not life threatening) in test pigs were various behavioral effects and increased vomiting and shivering.

Ground-feeding Birds: TRV = 3.64 mg/Kg-bw/day

This TRV was based on an 8 week NOAEL of 3.64 mg/Kg-bw/day for one day old domestic chickens exposed to cassava (Eisler 2000). There was no significant effect on chicken survival, growth, histology, hemoglobin, hematocrit, or lymphocyte number. The dose reported as 103 mg CN/Kg was multiplied by the feeding rate of chicks (0.06 Kg/d; King 1972) and then divided by the weight of 8-9 week old chickens (1.7 Kg; King 1972) to yield 3.64 mg/Kg-bw/day.

Passerine Birds: TRV = 0.09 mg/Kg-bw/day

This TRV was based on a single oral dose LC_{50} of 9.0 mg CN/Kg-bw for European starlings (males and females combined) exposed to sodium cyanide (Wiemeyer et al. 1986). The single oral dose LC_{50} of 9.0 mg/Kg-bw was divided by 100 to estimate a chronic NOAEL, resulting in a TRV of 0.09 mg/Kg-bw/day. **Used for American Robin, Marsh Wren, Belted Kingfisher.**

Ducks and Herons: TRV = 0.0143 mg/Kg-bw/day

This TRV was based on a single oral dose LD_{50} of 1.43 mg CN/Kg-bw for mallards exposed to sodium cyanide (NaCN) (Eisler, 1991). The NOAEL from the same study was 0.53 mg CN/Kg-bw. The LD_{50} of 1.43 mg/Kg-bw was divided by 100 to estimate a chronic NOAEL, resulting in a TRV of 0.0143 mg/Kg-bw/bw-day. **Used for Green Heron, Mallard, Reddish Egret, Wood Stork, Spotted Sandpiper, White Faced Ibis and Brown Pelican.**

Raptors: TRV = 0.021 mg/Kg-bw/day

This TRV was based on a single oral dose LC_{50} of 2.1 mg CN/Kg-bw for adult American kestrel exposed to sodium cyanide (Wiemeyer et al. 1986). This value was divided by 100 to estimate a chronic NOAEL, resulting in a TRV of 0.021 mg/Kg-bw/day.

LEAD (Pb)

Small Mammals: TRV = 0.90 mg/Kg-bw/day

This TRV was based on a 9 month NOAEL of 0.90 mg/Kg-bw/day (5 mg/L) for rats dosed with lead acetate in drinking water (Grant et al. 1980; Kimmel et al. 1980). At the NOAEL, no effects were observed with respect to reproductive success, general growth, health, neurobehavioral development, and structural/functional integrity of target organ systems of exposed adult rats and fetotoxicity and teratogenicity of their offspring. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals, Raccoon, Coyote: TRV = 2.7 mg/Kg-bw/day

The only chronic study found for medium mammals was a 2 year NOAEL of 50 mg/Kg for dogs exposed to lead acetate in the diet (ATSDR, 1997). Dogs exposed to lead acetate in food showed no adverse hematological effects throughout the exposure period. The TRV was obtained by multiplying the dietary dose (50 mg/Kg) by the average daily consumption of dogs (0.45 Kg/d; Ambrose et al. 1976) and then dividing by the estimated weight of adult beagle dogs (8.3 Kg; Gralla et al. 1977) to yield a TRV of 2.7 mg/Kg-bw/day. **Used this value for the Raccoon and Muskrat.**

Deer and Other Large Mammals: TRV = 3.98 mg/Kg-bw/day

This TRV was based on a 105 day NOAEL of 6.25 mg/Kg-bw/day for horses exposed to lead acetate (3.98 mg/Kg-bw/day as lead) in feed (Eisler, 1988). The endpoint was mortality. This value was similar to other NOAEL values found for cattle, which ranged from 3-3.5 mg/Kg-bw/day (Zmudski et al. 1983). Chronic (multi-year) LOAELs for cattle from other studies were reported to be between 6-7 mg/Kg-bw/day (Zmudski et al. 1983). **Used this value for the Painted Turtle with a UF of 100 based on reptilian/mammalian variability.**

Ground-Feeding Birds - Chicken/Pheasant and Turkey: TRV = 0.12 mg/Kg-bw/day

This TRV was based on the data from Edens and Garlich (1983), who reported 10 week (1.82 mg/Kg-bw/day) and 17-week (0.12 mg/Kg-bw/day) LOAEL values for Leghorn hens and Japanese quail hens, respectively. The LOAELs were based on significant decreases in egg production. With respect to the other studies found for ground-feeding birds, the 0.12 mg/Kg-bw/day value for Japanese quail is at least 10 times lower than other NOAEL and LOAEL values and appears quite conservative. As such, the TRV was set to 0.12 mg/Kg-bw/day.

Ducks: TRV = 2.2 mg/Kg-bw/day

This TRV was based on a 12 week NOAEL for mallard ducks exposed to lead nitrate (Finley et al. 1976). The value reported by Finley et al. (1976) as 21.63 mg/Kg dry feed was multiplied by the amount of dry feed consumed daily by the exposed mallards (0.119 Kg) and divided by the average weight of mallards (1.16 Kg) to yield a TRV of 2.2 mg/Kg-bw/day. The NOAEL was based on survival, body weight, and food consumption. **Used this value for the Mallard.**

Waterbirds: TRV = 0.44 mg/Kg-bw/day

No studies were found exposing waterbirds to lead. This value was based on the TRV for ducks of 2.2 mg/Kg-bw/day. The duck TRV of 2.2 mg/Kg-bw/day was divided by 5 to account for inter-taxon variability, resulting in a TRV for waterbirds of 0.44 mg/Kg-bw/day. **Used this value for the Green Heron, White-faced Ibis, Brown Pelican, Wood Stork, Reddish Egret and Spotted Sandpiper.**

Raptors: TRV = 20 mg/Kg-bw/day

This TRV was based on a 5 month NOAEL for American kestrels (Pattee, 1984) reported as 54 mg/Kg feed (20 mg/Kg-bw/day). This value was multiplied by the amount of feed consumed daily by the kestrels (0.05 Kg) and divided by the average weight of the exposed kestrels (0.135 Kg) to yield a TRV of 20.0 mg/Kg-bw/day. No adverse effects were observed with respect to survival, egg laying, initiation of incubation, clutch size, fertility, and eggshell thickness (Pattee, 1984). Based on the same data, no effects were observed with respect to histopathological lesions, body weights, or organ weights (Franson et al. 1983). Although other raptor studies were found reporting lower NOAELs, the values reported were the highest doses tested (and hence conservative) and none were based on population level effects.

Passerine Birds: TRV = 0.93 mg/Kg-bw/day

This TRV was based on an 11 day NOAEL value of 2.8 mg/Kg-bw/day for starlings exposed to trialkyl lead (Osborn et al. 1983). The NOAEL was based on survival, growth, and food consumption. The NOAEL was divided by 3 to estimate a chronic NOAEL, resulting in a TRV of 0.93 mg/Kg-bw/day. No other data were found. **Used this value for the American Robin, Belted Kingfisher, and the Marsh Wren.**

MANGANESE (Mn)

Small Mammals: TRV = 44 mg/Kg-bw/day

This TRV is based on a 224 day NOAEL of 44-88 mg/Kg-bw/day for rats exposed to manganese oxide in feed (Laskey et al. 1982). The NOAEL was based on fertility (percent pregnant). A NOAEL based on litter size, ovulations, resorptions, preimplantation deaths, and fetal weights was 158-316 mg/Kg-bw/day. **Used this value Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals: TRV = 8.8 mg/Kg-bw/day

No studies were found exposing medium mammals to manganese. This value was based on the TRV for small mammals of 44 mg/Kg-bw/day. This value was divided by 5 to account for inter-taxon variability, resulting in a TRV for medium mammals of 8.8 mg/Kg-bw/day. **Used this value for the Raccoon and Muskrat.**

Large Mammals: TRV = 10.6 mg/Kg-bw/day

This TRV is based on a 35 day NOAEL of 10.6 mg/Kg-bw/day (500 ppm) for newborn cattle exposed to manganese sulfate in milk (Jenkins and Hidiroglou 1991). Endpoints included weight gain and daily milk and feed intake. No other data were found for large mammals. **Used this value for the Painted Turtle with a UF of 100 based on reptilian/mammalian variability.**

All Birds: TRV = 7.3 mg/Kg-bw/day

This TRV is based on a 6 week (approximate test duration) value of 7.3 mg/Kg-bw/day for guinea fowl exposed to manganese sulfate (Offiong and Abed 1980). This study was designed to assess the nutritional deficiencies of manganese and the maximum dose examined significantly improved the fertility, hatchability, and embryos of guinea fowl compared to controls. Therefore, the maximum dose examined (70 mg/Kg feed; 7.3 mg/Kg-bw/day) represents a required dose for successful reproduction and is likely considerably lower than a true NOAEL. *As such, this value should be considered extremely conservative.* **Used this value for the American Robin, Belted Kingfisher, Mallard, Green Heron, Brown Pelican, Wood Stork, Reddish Egret, White-faced Ibis, Marsh Wren, and Spotted Sandpiper.**

ORGANIC MECURY (Hg)

Small Mammals: TRV = 0.05 mg/Kg-bw/day

This TRV was based on a 26 month NOAEL of 0.05 mg/Kg-bw/day for rats exposed to methylmercuric chloride in the diet (Munro et al. 1980). The NOAEL was based on survival, body weight, food consumption, and general clinical signs of mercury toxicity (i.e., ruffled fur, loss of balance, hind leg crossing, paralysis). This was the lowest NOAEL found for small mammals exposed to mercury. **Used this value for the Short-tailed shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals: TRV = 0.076 mg/Kg-bw/day

This value was based on a 93 day NOAEL of 0.076 mg/Kg-bw/day for adult female mink exposed to methyl mercury chloride (Wobeser et al. 1975). No obvious clinical signs of toxicity were observed (e.g., anorexia, weight loss, ataxia, head tremors) at the NOAEL dose after 93 days. The NOAEL dose of 1.1 mg/Kg feed was multiplied by the average daily feeding rate for mink (0.069 Kg/d; Aulerich et al. 1985) and then divided by the average weight of adult female mink (1.0 Kg-bw; U.S. EPA 1993) to obtain a TRV of 0.076 mg/Kg-bw/day. The mink value was used to generate the TRV because it is more taxonomically similar to these small mammal receptors than domestic animals such as cats. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle with a UF of 100 based on reptilian/mammalian variability.**

Deer: TRV = 0.036 mg/Kg-bw/day

This TRV was based on a single oral dose LD_{50} of 17.88 mg/Kg-bw for mule deer (Hudson et al. 1984). Deer were exposed to the pesticide MEMA RM (7.5% mercury), resulting in a LD_{50} of 250 mg MEMA RM/Kg-bw. This value was multiplied by 7.15% mercury to yield 17.88 mg Hg/Kg-bw. Symptoms included pilorection, bloody diarrhea, and anorexia. This value was divided by 500 to estimate a chronic NOAEL of 0.036 mg/Kg-bw/day.

Ground-Feeding Birds: TRV = 0.11 mg/Kg-bw/day

This TRV was based on a 6 week NOAEL of 0.34 mg/Kg-bw/day for 12-day-old bobwhite quail chicks exposed to methylmercury chloride (Spann et al. 1986). No significant adverse effects on survival were observed at the NOAEL dose. The 4.3 mg Hg/Kg value reported by the authors was multiplied by the ingestion rate (0.0133 Kg/d) and then divided by the body weight of adult bobwhite quail (0.17 Kg) to yield 0.34 mg/Kg-bw/day. Ingestion rates and body weights of quail were obtained from Damron and Wilson (1975). This value was divided by 3 to yield a chronic NOAEL TRV of 0.11 mg/Kg-bw/day.

Ducks: TRV = 0.078 mg/Kg-bw/day

This TRV was based on a 12 month NOAEL for mallard ducks (Heinz, 1974). The value reported in Heinz (1974) as 0.5 mg MeHg/Kg feed (methylmercury dicyandiamide, or Morsodren) was multiplied by an ingestion rate of 0.156 Kg/day (Heinz, 1979) to yield a TRV of 0.078 mg/Kg-bw/day. The endpoints measured included mortality and various measures of reproductive success, including survival of hatchlings and sound eggs/hen-day. **Used this value for the Mallard.**

Waterbirds: TRV = 0.035 mg/Kg-bw/day

This TRV was based on a 93 day LOAEL of 0.18 mg/Kg-bw/day for juvenile great egrets exposed to methyl mercury chloride via oral gavage (Bouton et al. 1999). The LOAEL was based on time to capture fish prey and overall hunting ability. No outward signs of toxicity were observed. The LOAEL dose of 0.5 mg MeHg/Kg diet was multiplied by the average food ingested by great egret nestlings (0.131 Kg/day; Frederick et al. 1999) and then divided by the body weight reported for snowy egrets (0.371 Kg; Rattner et al. 1999) to yield 0.18 mg/Kg-bw/day. This LOAEL was divided by five to estimate a NOAEL, resulting in a TRV of 0.035 mg/Kg-bw/day. **Used this value for the Brown Pelican, Green Heron, White-faced Ibis, Wood Stork, Reddish Egret and Spotted Sandpiper.**

Raptors: TRV = 0.42 mg/Kg-bw/day

This TRV was based on a 12 week NOAEL of 0.42 mg/Kg-bw/day for red-tailed hawks exposed to methylmercury dicyandiamide (Panogen 15) (Fimreite and Karstad 1971). The dietary dose reported as 0.575 mg MeHg/day was divided by the average mass of the hawks exposed (1.373 Kg) to yield 0.42 mg/Kg-bw/day. The NOAEL was based on mortality and the presence of axon and myelin sheath lesions in the spinal cord.

Passerine Birds: TRV = 0.29 mg/Kg-bw/day

This TRV was based on a 76 day NOAEL of 0.88 mg/Kg-bw/day (2.5 mg/kg dry feed) for zebra finches exposed to methyl mercury (Scheuhammer 1988). The NOAEL was based on survival and outward signs of neurological impairment (i.e., inability to perch or fly). This value was divided by 3 to estimate a chronic NOAEL TRV of 0.29 mg/Kg-bw/day. **Used this value for the American Robin, Marsh Wren, and Belted Kingfisher.**

NICKEL (Ni)

Small Mammals: TRV = 47.5 mg/Kg-bw/day

This TRV was based on a 2 year NOAEL value of 47.5 mg/kg-bw/day found for rats exposed to nickel sulfate in the diet (Ambrose et al, 1976). The TRV was obtained by multiplying 1000 mg/Kg diet by the daily consumption of rats (0.019 Kg; Nagy, 1987) and then dividing by the average weight of rats used in the study (approximately 0.40 Kg) to yield a NOAEL of 47.5 mg/Kg-bw/day. The Ambrose et al. (1976) study encompassed 3 generations of rats based on reproductive success including number of pups born alive and dead, number of pups weaned, and weanling body weight. Although the authors reported reductions in mean body weights at the TRV in a separate experiment, the growth effects did not adversely affect reproductive success in subsequent generations. **Used this value Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals: TRV = 54.2 mg/kg-bw/day

The NOAEL value was based on a 2 year NOAEL of 54.2 mg/Kg-bw/day for beagle dogs exposed to nickel sulfate in the diet (Ambrose et al. 1976). The endpoints were survival, body weight gain, and overall body weight. The TRV was obtained by multiplying the dietary dose of 1000 mg/Kg by the average daily consumption of dogs given by the authors (0.45 Kg/d) and then dividing by the estimated weight of adult beagle dogs (8.3 Kg; Gralla et al. 1977. This was the only toxicity study found that exposed medium-sized mammals to nickel. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle with a UF of 100 based on reptilian/mammalian variability.**

Deer: TRV = 10.8 mg/kg-bw/day

No data were found regarding nickel exposure to large mammals. The deer TRV was extrapolated from the medium mammal TRV of 54.2 mg/Kg-bw/day by dividing by 5 to account for inter-taxon variability.

Ducks: TRV = 129.5 mg/Kg-bw/day

This TRV was based on a 90 day NOAEL for mallard ducks exposed to nickel sulfate in the diet (Eastin and O'Shea, 1981). The value reported in Eastin and O'Shea (1981) as 800 mg/Kg feed was multiplied by the amount of dry feed consumed daily by the adult mallards studied (0.178 Kg) and divided by the weight of an adult mallard (1.1 Kg; USEPA 1993). The endpoints were based on reproduction and included number of sound eggs per hen per day, fertile eggs set, hatchability, hatching weights, and proportion offspring surviving to two weeks. **Used this value for the Mallard.**

Ground-Feeding Birds: TRV = 9.43 mg/Kg-bw/day

The NOAEL value was based on a 4 week NOAEL of 28.3 mg/Kg-bw/day for domestic chicks exposed to nickel acetate (Weber and Reid, 1968). The 4 week NOAEL for chicks exposed to nickel sulfate was 31.0 mg/Kg-bw/day (Weber and Reid, 1968). The nickel acetate value reported in Weber and Reed (1968) as 383 mg Ni consumed per bird for 4 weeks was divided by 28 days to yield 13.6 mg nickel consumed per day and then further divided by chick body weights reported by the authors (0.484 Kg) to yield a TRV of 28.3 mg/Kg-bw/day. The endpoints were based on survival and change in body weights. The NOAEL was divided by 3 to estimate a chronic NOAEL TRV of 9.43 mg/Kg-bw/day.

Other Birds: TRV = 25.9 mg/Kg-bw/day

No data were found regarding heron or raptor exposure to nickel. This value was based on the TRV for ducks of 129.5 mg/Kg-bw/day. This value was divided by 5 to account for inter-taxon variability, resulting in a TRV of 25.9 mg/Kg-bw/day. **Used this value for the American Robin, Belted Kingfisher, Brown Pelican, Marsh Wren, White-faced Ibis, Green Heron, Wood Stork, Reddish Egret and Spotted Sandpiper.**

SELENIUM (Se)

Small Mammals: TRV = 0.09 mg/Kg-bw/day

This TRV was based on a 3 generation LOAEL of 0.45 mg/Kg-bw/day for mice exposed to selenium via drinking water (Schroeder and Mitchener 1971). The dietary dose of 3 mg/Kg (via water) was multiplied by the estimated daily water intake of 0.003 Kg/day (Calder and Braun 1983) and then divided by the estimated weight of an adult mouse (0.02 Kg) to obtain 0.45 mg/Kg-bw/day. The LOAEL was based on reduced survival of offspring in the F1 generation, reduced number of litters in the F3 generation, and failure of adult mice to breed in all three generations. This value was divided by 5 to estimate a chronic NOAEL of 0.09 mg/Kg-bw/day. **Used this value Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium and Large Mammals: TRV = 0.02 mg/Kg-bw/day

No data were found regarding medium or large mammal exposure to selenium. This value was based on the TRV for small mammals of 0.09 mg/Kg-bw/day. The small mammal value of 0.09 mg/Kg-bw/day was divided by 5 to account for inter-taxon variability, resulting in a TRV of 0.02 mg/Kg-bw/day. This TRV should be updated using recently available swine data. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle with a UF of 100 based on reptilian/mammalian variability.**

Ground-Feeding Birds: TRV = 0.26 mg/Kg-bw/day

This TRV was based on a 28 week NOAEL of 0.26 mg/Kg-bw/day for domestic chickens exposed to sodium selenite (Ort and Latshaw 1978). The NOAEL was based on decreased hatchability of chicks. Also, no significant effects on egg production, egg weight, or feeding rate were observed at this dose. The dietary level of 3.0 mg/Kg was multiplied by the feed consumption of dosed chickens (0.130 Kg/day) and then divided by the average body weight of chickens dosed (1.5 Kg) to yield a NOAEL of 0.26 mg/Kg-bw/day.

Herons, Ducks: TRV = 1.0 mg/Kg-bw/day

This TRV was based on an 11-12 week NOAEL of 1.0 mg/Kg-bw/day for mallard ducks (Heinz et al. 1987). No significant effects of selenium as sodium selenite or seleno-DL-methionine on weight, survival of adults, or on reproductive success were observed at this dose. Reproductive endpoints included survival, hatchability, and fertility of eggs and offspring. The dietary level of 10.0 mg/Kg was multiplied by the feed consumption of dosed mallards (0.10 Kg/d) and then divided by the average body weight of mallards used (1.0 Kg) to yield a NOAEL of 1.0 mg/Kg-bw/day. This was the lowest value found for selenium and waterfowl studies reporting population-level effects such as reproduction. **Used this value for the Mallard, Green Heron,**

Wood Stork, Reddish Egret and White-faced Ibis. Used this value for the Spotted Sandpiper with a UF of 10.

Raptors, Other Birds: TRV = 0.20 mg/Kg-bw/day

No data were found regarding other avian exposure to selenium. The duck TRV of 1.0 mg/Kg-bw/day was divided by 5 to account for inter-taxon variability, resulting in a TRV of 0.20 mg/Kg-bw/day. This value is consistent with the TRV calculated for ground-feeding birds of 0.26 mg/Kg-bw/day. **Used this value for the American Robin, Belted Kingfisher, Brown Pelican, and Marsh Wren.**

SILVER (Ag)

Small Mammals: TRV = 44.4 mg/Kg-bw/day

This TRV was based on a 37 week LOAEL of 222.2 mg/Kg-bw/day (1587 mg Ag/L) for rats exposed to silver nitrate in drinking water (ATSDR, 1990). The endpoints were survival and decreased weight gain. The LOAEL was divided by 5 to estimate a NOAEL TRV of 44.4 mg/Kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium and Large Mammals: TRV = 8.9 mg/Kg-bw/day

No data were found regarding medium or large mammal exposure to silver. The small mammal TRV of 44.4 mg/Kg-bw/day was divided by 5 to account for inter-taxon variability. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle with a UF of 100 based on reptilian/mammalian variability.**

Ground-Feeding Birds: TRV = 82.9 mg/Kg-bw/day

This TRV was based on a 2 week LOAEL of 1,243 mg/Kg-bw/day for newly hatched chickens exposed to silver nitrate (Jensen 1975). Decreased body weights and feed consumption of chicks were observed at this dose; chick survival was not affected. The dietary level of 1,000 mg/Kg was multiplied by the feed consumption of dosed chicks (0.215 Kg/day) and then divided by the average body weight of the chicks exposed (0.173 Kg to yield a LOAEL of 1,243 mg/Kg-bw/day. This value was divided by 3 to estimate a chronic LOAEL of 414 mg/Kg-bw/day and further divided by 5 to extrapolate from a LOAEL to a NOAEL, resulting in a TRV of 82.9 mg/Kg-bw/day.

Ducks: TRV = 2.8 mg/Kg-bw/day

This TRV was based on a 4 week NOAEL of 8.3 mg/Kg-bw/day for mallard ducklings fed silver acetate (Van Vleet 1982). The NOAEL was based on mortality. The dietary level of 50 mg/kg was multiplied by the feed consumption of 4 week-old mallards (0.1 Kg/day; Heinz et al. 1988) and then divided by the body weight of a 4 week old mallard (0.6 Kg; Heinz et al. 1988) to yield a NOAEL of 8.3 mg/Kg-bw/day. This value was divided by 3 to estimate a chronic NOAEL TRV of 2.8 mg/Kg-bw/day. **Used this value for the Mallard.**

Other Birds: TRV = 0.55 mg/Kg-bw/day

No data were found regarding raptor or passerine bird exposure to silver. The duck TRV of 2.8 mg/Kg-bw/day was divided by 5 to account for inter-taxon variability, resulting in a TRV of 0.55 mg/Kg/bw/day. **Used this value for the American Robin, Belted Kingfisher, Marsh Wren, Green Heron, White-faced Ibis, Spotted Sandpiper, Wood Stork, Reddish Egret and the Brown Pelican.**

VANADIUM (V)

Small Mammals: TRV = 2.1 mg/Kg-bw/day

This TRV was based on a 60 day NOAEL of 2.1 mg/Kg-bw/day for rats exposed to sodium metavanadate (Domingo et al. 1986). Although not significant, the number of dead young, dead/living ratio, and dead young/litter were substantially increased, and number of living young/litter and average body weight/litter were considerably reduced at 4.2 mg/Kg-bw/day (LOAEL) after 21 days of pup nursing. As such, the NOAEL was set at 2.1 mg/Kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals: TRV = 0.42 mg/Kg-bw/day

No data were found regarding medium mammal exposure to vanadium. The small mammal TRV of 2.1 mg/Kg-bw/day was used to extrapolate to the medium mammal TRV by dividing by 5 to account for inter-taxon variability. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle with a UF of 100 based on reptilian/mammalian variability.**

Chickens: TRV = 0.67 mg/Kg-bw/day

This TRV was based on a 3 week NOAEL of 8.8 mg/Kg for newly hatched chickens exposed to $Ca_3(VO_4)_2$ (Romoser et al. 1961). No significant effects on weight gain, feed conversion or survival were observed at this dose. The dietary level of 8.8 mg/Kg was multiplied by the ingestion rate of dosed chicks (0.038 Kg/day) and then divided by the average body weight of chicks at the end of the experiment (0.5 Kg) to yield a NOAEL of 0.67 mg/Kg-bw/day. **Used this value for the Brown Pelican with a UF of 10 based on inter-taxon variability.**

Heron, Kingfisher, Mallard, Robin: TRV = 0.13 mg/Kg-bw/day

No data were found regarding vanadium exposure to these receptors. The TRV for these birds was derived using the chicken TRV and dividing by an uncertainty factor of 5. **Used this value for the American Robin, Marsh Wren, Belted Kingfisher, Mallard, Green Heron, Wood Stork, Reddish Egret and White-faced Ibis. Used this value with a UF of 10 for Spotted Sandpiper.**

ZINC (Zn)

Small Mammals: TRV = 31.7 mg/Kg-bw/day

This TRV is based on a 13 week NOAEL of 31.7 mg/Kg-bw/day for male rats exposed to zinc sulfate in the diet (Maita et al.1981). The NOAEL was based on growth, food intake, presence of ulcerations in forestomach, decreased white blood cell count, anemia, and lack of regressive lesions. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on the amphibian/mammalian variability.**

Medium Mammals: TRV = 20.8 mg/Kg-bw/day

This TRV is based on a 25 week NOAEL (time-weighted average dose) of 20.8 mg/Kg-bw/day for mink exposed to zinc sulfate in the diet (Bleavins et al. 1983). The endpoints included gestational length, litter size, kit birth weights, and kit mortality and body weight to weaning. **Used this value for the Muskrat and Raccoon. Used this value for the Painted Turtle with a UF of 100 based on reptilian/mammalian variability.**

Deer: TRV = 5.0 mg/Kg-bw/day

This TRV is based on a chronic NOAEL of 5.0 mg/Kg-bw/day reported for sheep exposed to zinc sulfate for 45-152 days (James et al. 1966). The endpoints were no observable deformities or effects in lambs from ewes dosed throughout gestation.

Ground-Feeding Birds: TRV = 125 mg/Kg-bw/day

This TRV was based on a 12 week and 44 week exposures (NOAELs of 125 mg/Kg-bw/day) reported for domestic chickens (Stahl et al. 1990). The endpoints measured were overall egg production, egg fertility and hatchability, feed conversion, and feed consumption. The value reported in Stahl et al. (1990) as 2000 mg/Kg dry feed was multiplied by the amount of dry feed consumed daily by hens in controls (0.125 Kg) and divided by the weight of control hens (2.0 Kg) to yield a TRV of 125 mg/Kg-bw/day.

Ducks: TRV = 20.4 mg/Kg-bw/day

This TRV was based on a 60 day LOAEL for mallard ducks exposed to zinc carbonate in the diet (Gasaway and Buss, 1972). The value reported in Gasaway and Buss (1972) of 3,000 mg/Kg feed was multiplied by the average amount of dry feed consumed daily by exposed mallards (0.034 Kg) and divided by the weight of an adult mallard (1.0 Kg; Terres, 1982) to yield a LOAEL of 102.1 mg/Kg-bw/day. The endpoints were based on mortality, food consumption, changes in body weight, and testes and ovary weights. This value was divided by 5 to estimate a NOAEL of 20.4 mg/Kg-bw/day. **Used this value for the Mallard.**

Waterbirds: TRV = 4.1 mg/Kg-bw/day

No data were found regarding heron exposure to zinc. This value was based on the TRV for ducks of 20.4 mg/Kg-bw/day, which was divided by 5 to account for inter-taxon variation, resulting in a TRV of 4.1 mg/Kg-bw/day. **Used this value for the Brown Pelican, Green Heron, White-faced Ibis, Wood Stork, Reddish Egret and Spotted Sandpiper.**

Raptors and Passerines: TRV = 25 mg/Kg-bw/day

No data were found regarding raptor exposure to zinc. This value was based on the TRV for chicken/pheasant of 125 mg/Kg-bw/day because it was the most rigorous avian exposure to zinc found. This value was divided by 5 to account for inter-taxon variation, resulting in a TRV of 25 mg/Kg-bw/day for raptors. **Used this value for the American Robin, Belted Kingfisher, and Marsh Wren.**

ALDRIN

Small Mammals: TRV = 0.11 mg/Kg-bw/day

This TRV was based on a 2 year NOAEL of 0.11 mg/Kg-bw/day (2.5 mg/Kg feed) for rats (Treon and Cleveland 1955). The NOAEL was based on survival, growth, and 3 generations of rats based on reproductive success (number of deliveries, number of pups/litter, pup survival, and pup growth). A 2 year NOAEL of 0.46 mg/Kg-bw/day was also found (10 mg/Kg feed) for rats (Fitzhugh et al. 1964) based on survival and a 7 generation study of rats exposed to aldrin in the diet indicated a NOAEL of 0.13 mg/Kg-bw/day based on growth (Deichmann et al. 1975). **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals: TRV = 0.2 mg/Kg-bw/day

This TRV was based on a 2 year NOAEL value of 0.2 mg/Kg-bw/day (8 ppm diet) for dogs dosed with dieldrin in feed (Fitzhugh et al. 1964). No effects on survival, growth, convulsions, emaciation, dehydration, or hystopathological lesions were observed at the NOAEL dose. Also found was a 15.6 month NOAEL of 0.25 mg/Kg-bw/day (3.0 mg/Kg diet) for dogs based on survival and growth (Treon and Cleveland 1955). **Used this value for the Raccoon and Muskrat.**

Large Mammals: TRV = 0.04 mg/Kg-bw/day

No data were found regarding large mammal exposure to aldrin. This value was based on the TRV for medium mammals of 0.2 mg/Kg-bw/day, which was divided by 5 to account for inter-taxon variation, resulting in a TRV of 0.04 mg/Kg-bw/day. **Used this value for the Painted Turtle with a UF of 100 based on reptilian/mammalian variability.**

Ground-Feeding Birds: TRV = 0.05 mg/Kg-bw/day

This TRV was based on a 7 week NOAEL of 0.05 mg/Kg-bw/day for ring-necked pheasants (monitored for 21 weeks) with growth as the endpoint (Hall et al. 1971). A 96 h LD_{50} value of 4-4.5 mg/Kg-bw for bobwhite quail and a 96 h LD_{50} value of 15-17 mg/Kg-bw for mourning doves both dosed with aldrin in feed (Dahlen and Haugen 1954). If the quail value was divided by 100 to estimate a chronic NOAEL, the resultant value is similar to the TRV of 0.05 mg/Kg-bw/day.

Passerine Birds: TRV = 0.24 mg/Kg-bw/day

This TRV was based on an acute oral dose LD_{50} for European starlings of 23.7 mg/Kg-bw (Schafer et al. 1983). This value was divided by a UF of 100 to estimate a chronic NOAEL, resulting in a TRV of 0.24 mg/Kg-bw/day. **Used this value for the American Robin, Belted Kingfisher, and Marsh Wren.**

Other Birds: TRV = 0.01 mg/Kg-bw/day

No data were found regarding other bird exposure to aldrin. This TRV was based on the TRV for ground-feeding birds of 0.05 mg/Kg-bw/day, which was divided by 5 to account for inter-taxon variation, resulting in a TRV of 0.01 mg/Kg-bw/day. **Used this value for the Green Heron, White-faced Ibis, Mallard, Brown Pelican, Wood Stork, Reddish Egret and Spotted Sandpiper.**

BIS(2-CHLOROETHYL)ETHER

Small Mammals: TRV = 25 mg/Kg-bw/day

This TRV was based on a 78 week NOAEL of 25 mg/Kg-bw/day for rats exposed to bis(2-chloroethyl) ether via gavage (Weisburger et al. 1981). The NOAEL was based on survival and growth, with female survival and male and female body weights being adversely affected at the LOAEL dose of 50 mg/Kg-bw/day. Effects were monitored for a total of 104 weeks. Used for the Short-Tail Shrew. Used for the Bullfrog with a UF of 100.

Medium Mammals: TRV = 5.0 mg/Kg-bw/day

No data were found regarding medium mammal exposure. This TRV was based on the small mammal value of 25 mg/Kg/day and divided by 5 to account for interspecies extrapolation, resulting in a TRV of 5.0 mg/Kg-bw/day. **Used for the muskrat and raccoon. Used for the American Robin, Belted kingfisher. Use with UF of 100 for Painted Turtle, Mallard, Green Heron, Reddish Egret, Wood Stork,Marsh Wren, White-faced Ibis, Brown Pelican, and Painted Sandpiper.**

Birds: TRV = No Data

No data were found regarding bird exposure to bis(2-chloroethyl)ether.

CHLORDANE

THESE VALUES WERE USED FOR ALPHA AND GAMMA CHLORDANE RECEPTORS

Small Mammals: TRV = 3.44 mg/ Kg-bw/day

This TRV was based on a 6 generation NOAEL value for mice of 25 mg/Kg (Eisler, 1990) exposed to chlordane. The NOAEL was based on reproductive success in all six generations. The value of 25 mg/Kg feed was multiplied by the amount of dry feed consumed daily by a mouse (0.0045 Kg; Nagy, 1987) and divided by the average weight of mice at test termination (0.0327 Kg) to yield a TRV of 3.44 mg/Kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium and Large Mammals: TRV = 0.14 mg/Kg-bw/day

This TRV was based on a 2 year NOAEL value for dogs of 3.0 mg/Kg (Eisler, 1990) exposed to technical chlordane. The NOAEL was based on behavior, appearance, survival, weight gain, or blood chemistry. The dietary dose of 3.0 mg/Kg was multiplied by the estimated ingestion rate of 0.39 Kg/d (Nagy 1987) and then divided by the estimated weight of a beagle dog (8.3 Kg; Gralla et al. 1977) to obtain 0.14 mg/Kg-bw/day. . **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

Ducks and Herons: TRV = 0.86 mg/Kg-bw/day

This TRV was based on a 5 day LD_{50} value for 10-day old mallard ducklings of 858 mg/Kg (Eisler, 1990) exposed to technical chlordane. A single oral dose LD_{50} of 1,200 mg/Kg-bw was reported for 4-5 month old mallards (Hudson et al. 1984). Mallard ducks are apparently less sensitive to chlordane exposure compared to other birds, as adverse effects have been observed as low as 14.1 mg/Kg (single oral dose)(Eisler 1990). As such, the 5 day LD_{50} value of 858 mg/Kg was divided by 100 to estimate a chronic NOAEL. **Used this value for Green Heron.** Further divided by 10 to account for interspecies extrapolation, resulting in a TRV of 0.86 mg/Kg-bw/day. **Used this value for the Mallard, Wood Stork, Reddish Egret and Brown Pelican. Used this value for the Spotted Sandpiper and White-faced Ibis with a UF of 100 for inter-taxon variability.**

Ground-Feeding Birds: TRV = 2.5 mg/Kg-bw/day

This TRV was based on a 4 week NOAEL value for Japanese quail of 25 mg/Kg (Eisler, 1990). The NOAEL was based on survival, weight gain, and activity. A TRV of 2.5 mg/Kg-bw/day was calculated from the value reported in Eisler (1990) by multiplying 25 mg/Kg in Japanese quail diet by 10% of body weight consumed per day (0.009 Kg; Welty, 1982) by quail and then dividing by the average weight of quail used (0.09 Kg).

Passerine Birds: TRV = 0.05 mg/Kg-bw/day

This TRV was based on a 14 day LD_{50} value for European starlings of 200 mg/Kg (Eisler, 1990). The dose reported as feed (200 mg/Kg) was multiplied by the ingestion rate reported by the authors (0.02 Kg/d) and then dividing by the mass of an adult starling (0.75 Kg; Terres, 1982) to yield 5.33 mg/Kg-bw/day. This value was divided by 100 to estimate a chronic NOAEL, resulting in a TRV of 0.0533 mg/Kg-bw/day. **Used this value for the American Robin, Belted Kingfisher, and Marsh Wren.**

Raptors: TRV = 0.082 mg/Kg-bw/day

This TRV was based on a 40 day LD_{50} value for barn owl of 75 mg/Kg (Eisler, 1990). This dose was multiplied by the average amount of food consumed daily by adult barn owl (0.06 Kg; Welty, 1982) and divided by the weight of an adult barn owl (0.550 Kg; Terres, 1982) to yield 8.2 mg/Kg-bw/day. This value was then divided by 100 to estimate a chronic NOAEL, resulting in a TRV of 0.082 mg/Kg-bw/day.

DDE

Small Mammals: TRV = 1.9 mg/Kg-bw/day

This TRV was based on a 78 week LOAEL of 19 mg/Kg-bw/day for mice exposed to p,p'-DDE (NCI 1978; in ATSDR 1992). Significant numbers of liver carcinomas developed at this dose compared to controls. This value was similar to other chronic studies exmining the effects of p,p'-DDE to small mammals. The National Cancer Institute (NCI 1978; in ATSDR 1992) also reported a 78 week NOAEL of 34 mg/Kg-bw/day for mice and a 78 week NOAEL for rats of 23 mg/Kg-bw/day. The endpoints for these studies included various reproductive, histopathological, cardiovascular, hepatic, renal, gastrointestinal, and hematological endpoints. A 120-week LOAEL of 36 mg/Kg-bw/day for hamsters was also found (Rossi et al. 1983), with significant increased incidence of adrenal tumors at the reported dose (500 mg/Kg). The data found were quite consistent across species, with cancer effects occurring approximately an order of magnitude lower than other serious effects such as reproductive success. The 78 week LOAEL of 19 mg/Kg-bw/day for mice was divided by 10 to estimate a chronic NOAEL, resulting in a small mammal TRV of 1.9 mg/Kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium and Large Mammals: TRV = 0.84 mg/Kg-bw/day

No data were found regarding medium or large mammal exposure to DDE. This value was based on a 66 d NOAEL of 0.84 mg/Kg-bw/day for mink exposed to DDT (Jensen et al. 1977). The dietary concentration of 11.0 mg/Kg DDT was multiplied by the estimated mass of food consumed daily (0.069 Kg/day; Aulerich et al. 1985) and then divided by the average mass of an adult mink (0.9 Kg; Burt and Grossenheider, 1976) to yield 0.84 mg/Kg-bw/day. Endpoints measured included survival and reproductive success. Other values found examining the effects of DDT on medium mammals included a two generation NOAEL of 1.0 mg/Kg-bw/day for beagle dogs exposed to p,p'-DDT (Ottoboni et al. 1977; in ATSDR 1992). Deichmann et al. (1971; in ATSDR 1992) reported a 14 month LOAEL of 12 mg/Kg-bw/day for beagle dogs exposed to DDT, with maternal and fetal death occurring at this dose. The DDT data appear sufficiently conservative to protect medium mammals exposed to DDE, with the DDE medium mammal TRV of 0.84 mg/Kg-bw/day being less than the small mammal TRV. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

Herons and Ducks: TRV = 1.36 mg/Kg-bw/day

This TRV was based on a 1.5 year NOAEL of 1.36 mg/Kg-bw/day for mallards orally exposed to DDE (Heath et al. 1972). The exposure emcompassed two full breeding seasons and the endpoints were mortality and various reproductive endpoints. The value reported by Heath et al. (1972) of 10 mg/Kg feed was multiplied by the average amount of dry feed consumed daily by an adult mallard (0.15 Kg; Welty, 1982) and divided by the weight of an adult mallard (1.1 Kg; Terres, 1982) to yield a NOAEL of 1.36 mg/Kg-bw/day. Lundholm (1980) reported a NOAEL of 40 mg/Kg dry weight feed (5.45 mgKkg-bw/day) for adult mallards exposed to DDE for 45 days. The endpoint examined was eggshell thinning. Vangilder and Peterle (1980) reported a LOAEL of 10 mg/Kg feed (1.36 mg/Kg-bw/day) for mallards exposed to DDE for 4 months. The endpoints measured included survival, egg production and hatchability, and eggshell thickness. This study was not used to calculate the TRV because this experiment was less rigorous, i.e., single dose, shorter exposure duration, and fewer serious endpoints than was reported by Heath et al. (1972). A 5-day LD_{50} value of 3,570 mg/Kg was also reported for mallards (Heath et al. 1972). A 6 month LOAEL of 10.0 mg/Kg dry weight in feed (approximately 3.0 mg/Kg wet weight = 0.41 mg/Kg-bw/day) was found for black ducks (Longcore et al. 1971). The LOAEL was based on eggshell thinning and reduced survival of embryos and ducklings (Longcore et al. 1971). This value appears conservative when compared to other studies found for mallards. These data may indicate an increased suceptability of black ducks to DDE exposure compared to mallards. **Used this value for the Green Heron, White-faced Ibis, Mallard, Wood Stork, and Reddish Egret. Used this value for the Spotted Sandpiper and Brown Pelican with a UF of 10 based on inter-taxon variability.**

Chickens/Pheasants and Turkeys: TRV = 3.22 mg/Kg-bw/day

This TRV was based on a 3 month NOAEL of 3.00 mg/Kg-bw/day for bobwhite quail to DDE (Heath et al. 1972). The exposure emcompassed one full breeding season and the endpoints were mortality and several reproductive endpoints. The value reported by Heath et al. (1972) of 30 mg/Kg feed was multiplied by the average amount of dry feed consumed daily by an adult bobwhite quail (0.0183 Kg; Welty, 1982) and divided by the weight of an adult bobwhite quail (0.17 Kg; Terres, 1982) to yield a NOAEL of 3.22 mg/Kg-bw/day. Davison et al. (1976) reported a 13 week NOAEL of 200 mg/Kg (23.3 mg/Kg-bw/day) for Japanese quail based on body weight, reproductive success, and eggshell thinning. Five day LD_{50} values of 840 mg/Kg, 825 mg/Kg, and 1355 mg/Kg were also reported for ring-necked pheasant, bobwhite quail, and Japanese quail, respectively (Heath et al. 1972). If these LD_{50} values were appropriately divided by 100 to estimate a NOAEL, the TRV of 3.00 mg/Kg-bw/day would be protective of these species.

Raptors: TRV = 0.028 mg/kg-bw/day

This TRV was based on a 1 year LOAEL of 0.28 mg/Kg-bw/day for American kestrels to DDE (Wiemeyer et al. 1986). The exposure encompassed one full breeding season and the endpoints were mortality and eggshell thinning. The value reported by Wiemeyer et al. (1986) of 2.8 mg/Kg feed was multiplied by the average amount of food consumed daily by adult American kestrels (10% of body weight; Welty, 1982) and divided by the weight of an adult American kestrel (0.101 Kg; Terres, 1982) to yield a LOAEL of 0.28 mg/Kg-bw/day. Although significant eggshell thinning was observed at this dose, no other lethal or sublethal effects were observed. This value is similar to the LOAEL reported by Mendenhall et al. (1983) of 0.31 mg/Kg-bw/day for barn owls exposed to DDE for 2 years. The value reported by Mendenhall et al. (1983) of 2.83 mg/Kg feed was multiplied by the average amount of food consumed daily by adult barn owl (60 g; Welty, 1982) and divided by the weight of an adult barn owl (550 g; Terres, 1982) to yield a NOAEL of 0.31 mg/Kg-bw/day. Significant adverse effects were observed for number of eggs laid, percent eggs broken, mean eggs hatched, and mean young fledged. Also found was a 5 month NOAEL of 0.09 mg/Kg-bw/day for American kestrels, with eggshell thinning as the endpoint measured (Lincer 1975). The Wiemeyer et al. (1986) value of 0.28 mg/Kg-bw/day was divided by 10 to estimate a chronic NOAEL (TRV). Based on the data found, this should be protective of raptors.

Passerine Birds: TRV = 0.27 mg/Kg-bw/day

No data were found regarding passerine bird exposure to DDE. This value was based on the mallard value of 1.36 mg/Kg-bw/day and divided by 5 to account for interspecies extrapolation, resulting in a TRV of 0.27 mg/Kg-bw/day. **Used this value for the Marsh Wren, American Robin, and Belted Kingfisher.**

DDT

Small Mammals: TRV = 0.40 mg/Kg-bw/day

This TRV was based on a full life span NOAEL of 0.4 mg/Kg-bw/day for mice (Tarjan and Kemeny, 1969). Adverse effects were monitored for five generations, with the number of pregnancies, births, litters, offspring and surviving weanlings, the average body weight of mice at weaning or the average lifespan of each generation showing no significant differences from controls. Lung and adenocarcinomas occurred in the F2 generation and leukemia and pulmonary carcinomas occurred with increasing frequency in the F3, F4, and F5 generations. Since survival and reproductive success are more ecologically relevent endpoints from a population standpoint, they were used as a basis for TRV derivation rather than the luekemia endpoints. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals: TRV = 0.84 mg/Kg-bw/day

This TRV was based on a 66 day NOAEL of 0.84 mg/Kg-bw/day for mink (Jensen et al. 1977). The dietary concentration of 11.0 mg/Kg was multiplied by the estimated mass of food consumed daily (0.069 Kg/day; Aulerich et al. 1985) and then divided by the average mass of an adult mink (0.9 Kg; Burt and Grossenheider, 1976) to yield 0.84 mg/Kg-bw/day. This NOAEL value was based on survival and reproductive success. **Used this value for the Raccoon and Muskrat.**

Large Mammals: TRV = 2.9 mg/Kg-bw/day

This TRV was based on a 160-230 day NOAEL of 2.9 mg/Kg-bw/day for cattle (Thomas et al. 1951). No outward signs of toxicity or histological alterations were observed at concentrations ranging from 0.07 - 2.9 mg/Kg-bw/day (5.7-100 mg/Kg diet).

Chickens/Pheasants and Turkeys: TRV = 1.17 mg/Kg-bw/day

This TRV was based on a 16 week NOAEL of 1.17 mg/Kg-bw/day for Japanese quail (Davison et al. 1976). The NOAEL reported as 10 mg/Kg dietary feed was multiplied by the daily consumption of Japanese quail tested (0.014 Kg) and then divided by the body weight of quail tested (0.120 Kg) to yield a NOAEL of 1.17 mg/Kg-bw/day. Endpoints measured included survival, egg production, eggshell thickness and weight, and egg hatchability. **Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

Ducks: TRV = 0.23 mg/Kg-bw/day

This TRV was based on a 343 day NOAEL value of 0.23 mg/Kg-bw/day reported for mallards exposed to DDT (Davison and Sell 1974). The NOAEL dose was based on eggshell thickness, weight, and calcium content. Reproductive success expressed as number of eggs produced per day was not adversely affected. **Used this value for the Mallard.**

Waterbirds: TRV = 3.22 mg/Kg-bw/day

This TRV was based on a 5 day LC_{50} value of 1612 mg/Kg reported for male clapper rails (inhabits salt marshes) exposed to DDT (Van Velzen and Kreitzer 1975). Female rails were less sensitive than males, with a LC_{50} value of 1896 mg/Kg. This value was divided by 500 to estimate a NOAEL, yielding a TRV of 3.22 mg/Kg-bw/day. **Used this value for the Green Heron, Brown Pelican, White-faced Ibis, Belted Kingfisher, Wood Stork, Reddish Egret and Spotted Sandpiper.**

Passerine Birds: TRV = 1.42 mg/Kg-bw/day

Bengalese finches were exposed to DDT in feed for 48-115 days to examine DDT effects on mortality and time from pairing to egg laying (ovulation) (Jefferies 1967). Based on these effects, the NOAEL was approximately 42.8 mg/Kg feed (14.2 mg/Kg-bw/day). This value was multiplied by the observed feeding rate of 0.00466 Kg/d and then divided by the weight of finches studies (0.014 Kg) to yield 14.2 mg/Kg-bw/day. This value was divided by 10 to estimate a chronic NOAEL of 1.42 mg/Kg-bw/day. **Used this value for the American Robin and Marsh Wren.**

Raptors: TRV = 0.23 mg/Kg-bw/day

No data were found regarding raptor exposure to DDT. This value was based on the ground-feeding bird value of 1.17 mg/Kg-bw/day and divided by 5 to account for interspecies extrapolation, resulting in a TRV of 0.23 mg/Kg-bw/day.

DDD

Small Mammals: TRV = 5.83 mg/Kg-bw/day

This TRV was based on a 52 week NOAEL of 58.3 mg/Kg-bw/day for mice exposed to DDD (Haag et al. 1948). The NOAEL was based on mortality and growth. The NOAEL as expressed as 1200 mg/Kg diet was multiplied by the estimated food consumption rate of 0.017 Kg/d (Nagy, 1987) and then divided by the average mass of mice studied (0.35 Kg), resulting in a NOAEL of 58.3 mg/Kg-bw/day. This value appears unrealistically high compared to NOAELs for DDT. Chronic oral toxicity of DDD was one-third less toxic to rats compared to DDT (Haag et al. 1948). Chronic oral toxicity values for DDT for rats and mice is on the order of 0.4 mg/Kg-bw/day (Tarjan and Kemeny, 1969). As such, the NOAEL of 58.3 mg/Kg-bw/day was divided by 10 to account for uncertainty, resulting in a TRV of 5.83 mg/Kg-bw/day. **Used this value for the short-tailed shrew. Used this value for the bullfrog and painted turtle with a UF of 100 based on amphibian/mammalian and reptile/mammalian variability.**

Medium and Large Mammals: TRV = 1.17 mg/Kg-bw/day

No data were found regarding medium or large mammal exposure to DDD. This TRV was based on the small mammal value of 5.83 mg/Kg-bw/day and divided by 5 to account for interspecies extrapolation, resulting in a TRV of 1.17 mg/Kg-bw/day. **Used this value for the Raccoon and Muskrat.**

Ground-Feeding Birds: TRV = 3.86 mg/Kg-bw/day

This TRV was based on a single oral dose LC_{50} for ring-necked pheasants of 386 mg/Kg-bw (Hudson et al. 1984). A single oral dose LC_{50} for California quail of >760 mg/Kg-bw was also found (Hudson et al. 1984). The pheasant value was divided by a UF of 100 to estimate a chronic NOAEL, resulting in a TRV of 3.86 mg/Kg-bw/day.

Ducks: TRV = 20 mg/\Kg-bw/day

This TRV was based on a single oral dose LC_{50} for mallard ducks of >2,000 mg/Kg-bw (Hudson et al. 1984). This value was divided by a UF of 100 to estimate a chronic NOAEL, resulting in a TRV of 20 mg/Kg-bw/day. No other data were found. **Used this value for the Mallard.**

Other Birds: TRV = 0.77 mg/Kg-bw/day

No data were found regarding other bird exposure to DDD. This value was based on the ground-feeding bird value of 3.86 mg/Kg-bw/day and divided by 5 to account for interspecies extrapolation, resulting in a TRV of 0.77 mg/Kg-bw/day. **Used this value for the Green Heron, White Faced Ibis, Reddish Egret, Wood Stork, Brown Pelican, Marsh Wren, American Robin, Belted Kingfisher and the Spotted Sandpiper.**

BETA-BHC

Beta-Hexachlorocyclohexane (β-HCH or β -BHC) - Small Mammals: TRV = 2.80 mg/kg-bw/day

This value was based on a 13 wk NOAEL of 2.80 mg/kg-bw/day for rats fed beta-HCH (Van Velson et al. 1986). The NOAEL was based on survival, growth, feed consumption, and in male rats degeneration of seminiferous tubules and disruption of spermatogenesis, and in females, atrophy of uterus and ovaries. A 110 wk (full life span) LOAEL for mice of 16.0 mg/kg-bw/day based on mortality was also found (Thorpe and Walker 1973). **Used for the short-tailed shrew. Used for Painted Turtle and Bullfrog with a UF of 100 based in intertaxonomic variability.**

Beta-Hexachlorocyclohexane - Medium and Large Mammals: TRV = 0.56 mg/kg-bw/day

No data were found regarding medium or large mammal exposure to beta-HCH. This value was based on the small mammal value of 2.8 mg/kg-bw/day and divided by 5 to estimate a chronic NOAEL, resulting in a TRV of 0.56 mg/kg-bw/day. **Used for the Muskrat and Raccoon.**

Beta-Hexachlorocyclohexane - All Birds: TRV = 3.0 mg/kg-bw/day

No data were found regarding bird exposure to beta-HCH. This value was based on a 30 d EMLD of 30 mg/kg-bw/day for adult mallard ducks exposed to gamma-HCH (Lindane) (Hudson et al. 1984). The empirical minimum lethal dose (EMLD) is the lowest daily oral dosage that produced one to two deaths by the end of the 30 day period. The EMLD was divided by 10 to estimate a chronic NOAEL, resulting in a TRV of 3.0 mg/kg-bw/day. **Used for the Mallard, Marsh Wren, American Robin, Belted Kingfisher, Brown Pelican, Wood Stork, White-faced Ibis, Reddish Egret, Green Heron and the Spotted Sandpiper.**

ALPHA-BHC

Alpha-Hexachlorocyclohexane (α-HCH) - Small Mammals: TRV = 20 mg/kg-bw/day

This value was based on a 360 day NOAEL of 20 mg/kg-bw/day for rats exposed to technical HCH in the diet (Dikshith et al. 1991). The NOAEL was based on testicular degeneration in males. This value was less than the 90 d NOAEL found for rats exposed to α-HCH (50.2 mg/kg-bw/day) based on testicular atrophy, degeneration of seminiferous tubules, and disruption of spermatogenesis (Shivanandappa and Krishnakumari 1983) and less than the 48 wk NOAEL found for rats exposed to to α-HCH (24.4 mg/kg-bw/day) based on the presence of hepatomas and hepatocellular carcinomas (Ito et al. 1975). **Used for the short-tailed shrew. Used for Painted Turtle and Bullfrog with a UF of 100 based in intertaxonomic variability.**

Alpha-Hexachlorocyclohexane (α-HCH) - Medium Mammals: TRV = 4.0 mg/kg-bw/day

No data were found for α-HCH. This value was based on the TRV of 20 mg/kg-bw/day for small mammals. This value was divided by a UF of 5, resulting in a TRV of 4.0 mg/kg-bw/day. **Used for the Muskrat and Raccoon.**

Alpha-Hexachlorocyclohexane (α-HCH) – All Birds: TRV = 0.24 mg/kg-bw/day

No data were found for birds exposed to α-HCH. This value was based on a 96 h LD_{50} value of 120-130 mg/kg-bw for male bobwhite quail (females=190-210 mg/kg-bw) dosed with lindane (γ-HCH) in feed (Dahlen and Haugen 1954). The authors also reported a 96 h LD_{50} value of 350-400 mg/kg-bw for mourning doves. The quail value was divided by 100 to estimate a chronic NOAEL, resulting in 1.20 mg/kg-bw/day. The lindane (γ-HCH) value was divided by 5 to account for uncertainty in extrapolating from γ-HCH to α-HCH. **Used for the Mallard, Marsh Wren, American Robin, Belted Kingfisher, Brown Pelican, Wood Stork, White-faced Ibis, Reddish Egret, Green Heron and the Spotted Sandpiper.**

GAMMA- BHC

Lindane (γ-HCH) - Small Mammals: TRV = 7.39 mg/kg-bw/day

This value was based on a 3 generation NOAEL of 7.39 mg/kg-bw/day (100 mg/kg in feed) for rats exposed to Lindane (Palmer et al. 1978). The NOAEL was based on survival and a variety of reproductive endpoints in all three generations, including number of litters, litter size, pup weight, and survival of pups 21 days post partum. A 110 wk (full life span) LOAEL for mice of 32.0 mg/kg-bw/day based on mortality was also found (Thorpe and Walker 1973). Also found was a NOAEL of 10 mg/kg-bw/day for rabbits exposed for 12 d during pregnancy, with percent reductions in pregnancy rate (15%), percent pre-implantation loss (12-13% loss), and percent post-implantation loss (8-16% loss) (Palmer et al. 1978). **Used for the short-tailed shrew. Used for Painted Turtle and Bullfrog with a UF of 100 based in intertaxonomic variability**.

Lindane (γ-HCH) - Medium Mammals: TRV = 2.92 mg/kg-bw/day

This value was based on a 104 wk NOAEL of 2.92 mg/kg-bw/day (100 mg/kg in feed) for dogs exposed to Lindane (Rivett et al. 1978). The NOAEL was based on survival, growth, food consumption, organ weights, and various hematological and histological endpoints. **Used for the Muskrat and the Raccoon.**

Lindane (γ-HCH) - Ground-Feeding Birds: TRV = 1.20 mg/kg-bw/day

This value was based on a 96 h LD_{50} value of 120-130 mg/kg-bw for male bobwhite quail (females=190-210 mg/kg-bw) dosed with lindane in feed (Dahlen and Haugen 1954). The authors also reported a 96 h LD_{50} value of 350-400 mg/kg-bw for mourning doves. The quail value was divided by 100 to estimate a chronic NOAEL, resulting in a TRV of 1.20 mg/kg-bw/day. . **Used for the Mallard, Marsh Wren, American Robin, Belted Kingfisher, Brown Pelican, Wood Stork, White-faced Ibis, Reddish Egret, Green Heron and the Spotted Sandpiper with a UF of 10 for intrataxonomic variability.**

DIELDRIN

Small Mammals: TRV = 0.24 mg/Kg-bw/day

This TRV was based on a 6 generation NOAEL of 0.24 mg/Kg-bw/day (3 mg/Kg feed) for mice exposed to dieldrin (WHO 1989). No effects on survival or reproductive success in all six generations were observed at the NOAEL dose. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals: TRV = 0.2 mg/Kg-bw/day

This TRV was based on a 2 yr NOAEL value of 0.2 mg/Kg-bw/day (8 ppm in diet) for dogs dosed with dieldrin in feed (Fitzhugh et al. 1964). No effects on survival, growth, convulsions, emaciation, dehydration, or hystopathological lesions were observed at the NOAEL dose. **Used this value for the Raccoon and Muskrat.**

Large Mammals: TRV = 0.137 mg/Kg-bw/day

This TRV was based on a 3 year NOAEL value of 0.137 mg/Kg-bw/day (5 ppm in diet) for white-tailed deer exposed to dieldrin (Murphy and Korschgen 1970). The NOAEL was based on significantly reduced body weights of twin fawns, which lead to starvation and death of these fawns compared to controls. No adverse effects on adult survival, growth, reproduction, or growth rate of fawns was observed. **Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

Chickens/Pheasants and Turkeys: TRV = 0.28 mg/Kg-bw/day

This TRV was based on a 2 year NOAEL of 0.28 mg/Kg-bw/day (2 mg/Kg-bw/week) for homing pigeons orally dosed with dieldrin (HEOD). No adverse effects were observed with respect to adult survival, chick survival, and reproductive success. A 20 week NOAEL value of 0.92 mg/Kg reported for domestic male chickens exposed to dieldrin was also found (Ahmed et al. 1978). The 20 week NOAEL reported as 25 mg/Kg dietary feed was multiplied by the average measured daily consumption of chickens (0.0883 Kg) and then divided by the measured body weights of the chickens used (2.41 Kg) to yield a NOAEL of 0.92 mg/Kg-bw/day. Endpoints measured included survival, egg production, egg hatchability, fertility, and body weight. Shellenberger (1978) reported a chronic NOAEL of 1.0 mg/Kg feed (0.1 mg/Kg-bw/day) for Japanese quail exposed to DDT for four generations. The endpoints measured were growth, viability, and/or reproduction of offspring. This endpoint is considered conservative because it was the highest dose tested and no LOAEL was established. Genelly and Rhodes (1956) reported a 74 day NOAEL of 1.00 mg/Kg-bw/day (25 mg/Kg feed) for ring-necked pheasants. Endpoints measured included reproductive success, survival, food consumption, and change in body weight. Hill et al. (1976) reported a NOAEL of 9 mg/Kg (1.1 mg/Kg-bw/day) for Japanese quail exposed to dieldrin in feed for 75 days. Walker et al. (1969) reported a similar NOAEL of 10 mg/Kg (1.0 mg/Kg-bw/day) for Japanese quail exposed to dieldrin in feed for 18 weeks. Five- day LD_{50} values of 55 mg/Kg, 39 mg/kg, and 56 mg/Kg were reported for ring-necked pheasant, bobwhite quail, and Japanese quail, respectively (Heath et al. 1972). A 3 month study (Neill et al. 1971) examining the effects of 3.0 mg/Kg on gray partridge resulted in a NOAEL of 0.24 mg/Kg-bw/day but was not used here beacause it was much less rigorous (i.e., one treatment; fewer endpoints) than the study by Ahmed et al. (1978).

Ducks: TRV = 2.00 mg/Kg-bw/day

This TRV was based on a 5 day LC_{50} value of 200 mg/Kg reported for mallards exposed to dieldrin (Heath et al. 1972). This value was divided by 100 to estimate a NOAEL of 2.00 mg/Kg-bw/day. **Used this value for the Mallard.**

Raptors: TRV = 0.06 mg/kg-bw/day

This TRV was based on a 2 year NOAEL value of 0.06 mg/Kg-bw/day reported for barn owls exposed to dieldrin (Mendenhall et al. 1983). The NOAEL reported as 0.58 mg/Kg dietary feed was multiplied by the estimated daily consumption of barn owls (0.06 Kg) and then divided by the mass of adult barn owls (0.550 Kg) to yield a NOAEL of 0.06 mg/Kg-bw/day. Endpoints measured included survival, egg production, egg hatchability, and reproductive success. Since there was only one dose examined, this TRV value is considered quite conservative.

Other Birds: TRV = 0.056 mg/Kg-bw/day

No data were found regarding passerine or waterbird exposure to dieldrin. This value was based on the ground-feeding bird value of 0.28 and divided by 5 to account for interspecies extrapolation, resulting in a TRV of 0.056 mg/Kg-bw/day. **Used this value for the American Robin, Belted Kingfisher, Marsh Wren, Wood Stork, Reddish Egret, Green Heron, White-faced Ibis, Brown Pelican, and Spotted Sandpiper.**

ENDOSULFAN

(USED FOR ENDOSULFAN I AND II)

Small Mammals: TRV = 0.026 mg/Kg-bw/day

This TRV was based on a 78 week LOAEL of 0.26 mg/Kg-bw/day (2.0 ppm diet) female mice (ATSDR 1990). The LOAEL was based on the presence of ovarian cysts in females. In the same study, testicular atrophy was observed in male mice at 0.46 mg/Kg-bw/day (3.5 mg/Kg diet). The female value was divided by 10 to estimate a chronic NOAEL, resulting in a TRV of 0.026 mg/Kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals: TRV = 0.0052 mg/Kg-bw/day

No data were found regarding medium mammal exposure to endosulfan. This value was based on the small mammal value of 0.026 and divided by 5 to account for interspecies extrapolation, resulting in a TRV of 0.0052 mg/Kg-bw/day. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

Ducks: TRV = 0.065 mg/Kg-bw/day

This TRV was based on a single oral dose LD_{50} of 6.47 mg/Kg for 7 day old mallards exposed to endosulfan (Hudson et al. 1972). This value was divided by 100 to estimate a NOAEL, resulting in a TRV of 0.065 mg/Kg-bw/day. Other single oral dose LD_{50}s found for mallards were: (age=36 hour, LD_{50}=27.8 mg/Kg), (age=7 day, LD_{50}=6.47 mg/Kg), (age=30 day, LD_{50}=7.89 mg/Kg), (age=6 month, LD_{50}=34.4 mg/Kg) (Hudson et al. 1972), and (age=3 month, LD_{50}=33.0 mg/Kg), (age=12 month males, LD_{50}=45.0 mg/Kg), and (age=12 month females, LD_{50}=31.2 mg/Kg) (Hudson et al. 1984). **Used this value for the Mallard**

Ground-Feeding Birds: TRV = 1.9 mg/kg-bw/day

This value was based on a single oral dose LD50 of 190 mg/kg for 3-4 mo old pheasants exposed to endosulfan (Hudson et al. 1972). This value was divided by 100 to estimate a NOAEL, resulting in a TRV of 1.9 mg/kg-bw/day. Female pheasants aged 12 mo females had an LD50 of>320 mg/kg from the same study.

Other Birds: TRV = 0.013 mg/kg-bw/day

No data were found regarding raptor, waterbird, or passerine bird exposure to endosulfan. This value was based on the duck value of 0.065 and divided by 5 to account for interspecies extrapolation, resulting in a TRV of 0.013 mg/kg-bw/day. **Used this value for the Belted Kingfisher, Marsh Wren, Brown Pelican, Green Heron, Wood Stork, Reddish Egret, White-faced Ibis, American Robin, and Spotted Sandpiper.**

ENDRIN

Small Mammals: TRV = 0.87 mg/kg-bw/day

This value was based on a 14 d LC50 value of 87 mg/kg for 30-75 d old male short-tailed shrews (Blus 1978). Other age groups of male and female shrews were less sensitive to endrin exposure, with 14 d LC50 values ranging from 152 to 174 mg/kg. This value was divided by 100 to estimate a chronic NOAEL, resulting in a TRV of 0.87 mg/kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals: TRV = 0.17 mg/kg-bw/day

No data were found regarding medium mammal exposure to endrin. This value was based on the small mammal value of 0.87 and divided by 5 to account for interspecies extrapolation, resulting in a TRV of 0.17 mg/kg-bw/day. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

Ground-Feeding Birds: TRV = 0.10 mg/kg-bw/day

This value was based on a 10 wk NOAEL of 0.10 mg/kg-bw/day for ring-necked pheasants (DeWitt 1956). The NOAEL was based on adult survival, egg production, egg fertility, hatchability of eggs, and chick survival. The NOAEL reported as 2 mg/kg dietary feed was multiplied by the estimated daily consumption (0.057 kg/d; Genelly and Rudd 1956) and then divided by the estimated body weight of adult pheasants (1.13 kg; Genelly and Rudd 1956) to yield a NOAEL of 0.10 mg/kg-bw/day. Five-day LC50 values reported for ring-necked pheasant, bobwhite quail, and Japanese quail to endrin were also found (Heath et al. 1972). Five day LD50 values of 14 mg/kg, 15 mg/kg, and 15 mg/kg were reported for ring-necked pheasant, bobwhite quail, and Japanese quail, respectively (Heath et al. 1972). The lowest LD50 value for ring-necked pheasant was divided by 100 to estimate a NOAEL of 0.14 mg/kg-bw/day. Kreitzer (1980) observed significant behavioral effects at 0.0058 mg/kg-bw/day (0.1 ppm diet) (error scores - total errors made when exposed to visual stimuli or patterns) of bobwhite quail exposed to endrin for 171 d. Birds treated at 0.058 mg/kg-bw/day (1.0 ppm diet) exhibited minimal adverse behavior. Since behavioral effects observed have unknown impacts on serious effects on individuals or populations of these birds, the Kreitzer (1980) study was not used.

Herons and Ducks: TRV = 0.14 mg/kg-bw/day

This value was based on a 6 mo NOAEL value of 0.14 mg/kg reported for mallards exposed to endrin (Spann et al. 1986). The NOAEL reported as 1 mg/kg dietary feed was multiplied by the estimated daily consumption of mallards (0.15 kg/d; Welty, 1982) and then divided by the measured body weight of mallards used (1100 g) to yield a NOAEL of 0.14 mg/kg-bw/day. Endpoints measured included survival, body weights, and reproductive success. Roylance et al. (1985) reported a 20 wk NOAEL of 0.36 mg/kg-bw/day (3.0 mg/kg feed) for mallards based on reproductive success (egg hatchability, viability, fertility, survival, and hatchling survival). A 5 d LC50 value of 22 mg/kg reported for mallards exposed to endrin was also found (Heath et al. 1972). **Used this value for the Mallard, Green Heron, Wood Stork, Reddish Egret and White-faced Ibis. Used this value for the Spotted Sandpiper and brown Pelican with a UF of 10 based on inter-taxon variability.**

Raptors: TRV = 0.0075 mg/kg-bw/day

This value was based on an 83 d LOAEL value of 0.075 mg/kg reported for screech owls exposed to endrin (Fleming et al. 1982). The LOAEL reported as 0.75 mg/kg dietary feed was multiplied by the estimated daily consumption of screech owls (0.015 kg; Welty, 1982) and then divided by the estimated body weight of adult screech owls (150 g; Terres, 1982) to yield a NOAEL of 0.075 mg/kg-bw/day. Endpoints measured included survival, egg production, egg hatchability, and other reproductive endpoints. This value was divided by 10 to estimate a chronic NOAEL of 0.0075 mg/kg-bw/day.

Passerine Birds: TRV = 0.02 mg/kg-bw/day

No data were found regarding passerine bird exposure to endrin. This value was based on the ground-feeding bird value of 0.10 and divided by 5 to account for interspecies extrapolation, resulting in a TRV of 0.02 mg/kg-bw/day. **Used this value for the American Robin, Belted Kingfisher, and Marsh Wren.**

Endrin Ketone - All Receptors (Used Endrin Values)

HEPTACHLOR

Small Mammals: TRV = 0.60 mg/kg-bw/day

This value was based on an 18 mo LOAEL of 6.0 mg/kg-bw/day for rats exposed to heptachlor in feed (ATSDR 1991). The LOAEL was based on adult mortality, litter size, and neonatal mortality. This value was divided by 10 to estimate a chronic NOAEL, resulting in a TRV of 0.60 mg/kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals: TRV = 0.57 mg/kg-bw/day

This value was based on a 30 d NOAEL of 5.67 mg/kg-bw/day for mink exposed to heptachlor in feed (ATSDR 1991). The NOAEL was based on adult mortality and body weight. This value was divided by 10 to estimate a chronic NOAEL, resulting in a TRV of 0.57 mg/kg-bw/day. **Used this value for the Raccoon and Muskrat.**

Large Mammals: TRV = 0.20 mg/kg-bw/day

This value was based on a 78 d NOAEL of 2.0 mg/kg-bw/day for pigs exposed to heptachlor in feed (ATSDR 1991). The NOAEL was based on body weight gain, increased lysosomes, decreased glycogen, and increased agranular endoplasmic reticulum in liver cells. This value was divided by 10 to estimate a chronic NOAEL, resulting in a TRV of 0.20 mg/kg-bw/day. **Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

Passerine Birds: TRV = 1.81 mg/kg-bw/day

This value was based on a single oral dose LD50 of 181 mg/kg for American woodcocks exposed to heptachlor (Stickel et al. 1965). The authors did not report an LD50, but at 181 mg/kg, two of four birds dosed died. No other data were found. This value was divided by 100 to estimate a NOAEL, resulting in a TRV of 1.81 mg/kg-bw/day. **Used this value for the American Robin, Marsh Wren, and Belted Kingfisher.**

Other Birds: TRV = 0.36 mg/kg-bw/day

No data were found regarding other bird exposure to heptachlor. This value was based on the passerine value of 1.81 and divided by 5 to account for interspecies extrapolation, resulting in a TRV of 0.36 mg/kg-bw/day. **Used this value for the Green Heron, Wood Stork, Reddish Egret, White-faced Ibis, Brown Pelican, Spotted Sandpiper, and Mallard.**

METHOXYCHLOR

Methoxychlor - Small Mammals: TRV = 25 mg/kg-bw/day

This value was based on an 11 week NOAEL of 25 mg/kg-bw/day for rats exposed to methoxychlor (Gray et al., 1989). The NOAEL was based on male growth and female reproductive effects after 11 weeks of observation. **This value was used for the Short-tailed Shrew. A UF of 100 was used for the Painted Turtle and Bullfrog to account for reptilian and amphibian/mammalian variability.**

Methoxychlor - Medium and Large Mammals: TRV = 35 mg/kg-bw/day

This value was based on a 24 week NOAEL of 35 mg/kg-bw/day for dogs exposed to methoxychlor (Tegeris et al., 1966). The NOAEL was based on growth after 24 weeks of observation. The exposure of 1000 mg/kg was multiplied by the mass of food consumed per day (0.245 kg) and then divided by the approximate mean weight of exposed dogs (7.0 kg) to yield a NOAEL of 35 mg/kg-bw/day. **Used this value for the Raccoon and Muskrat.**

Methoxychlor - Ducks and Waterbirds: TRV = 4.0 mg/kg-bw/day

This value was based on a single oral dose LC_{50} for mallard ducks of >2,000 mg/kg-bw (Hudson et al. 1984). This value was divided by a UF of 500 to estimate a chronic NOAEL, resulting in a TRV of 4.0 mg/kg-bw/day. No other data were found regarding duck exposure to methoxychlor. **This value was used for the Mallard, Green Heron, Reddish Egret, Wood Stork, White Faced Ibis and Brown Pelican**.

Methoxychlor - Ground-Feeding Birds: TRV = 4.0 mg/kg-bw/day

This value was based on a single oral dose LC_{50} for sharp-tailed grouse and California quail of >2,000 mg/kg-bw (Hudson et al. 1984). This value was divided by a UF of 500 to estimate a chronic NOAEL, resulting in a TRV of 4.0 mg/kg-bw/day. No other data were found regarding ground-feeding bird exposure to methoxychlor.

Methoxychlor - Other Birds: TRV = 37.5 mg/kg-bw/day

This value was based on a 5 d NOAEL of 3,750 mg/kg-bw/day for robins fed earthworms injected with methoxyclor (Hunt & Sacho 1969). The NOAEL was based on mortality after 10 days of observation. This value was divided by a UF of 100, resulting in a TRV of 37.5 mg/kg-bw/day. Also found was a single intraperitoneal injection (in peanut oil) LD50 of 2,100 mg/kg reported for house sparrows and a single intraperitoneal injection (in peanut oil) NOAEL of 2,400 mg/kg reported for robins (Hunt & Sacho 1969). **This value was used for the American Robin, Marsh Wren, Spotted Sandpiper and Belted Kingfisher.**

TOXAPHENE

Toxaphene - Ground-Feeding Birds: TRV = 0.416 mg/kg-bw/day

This value was based on a 74 d NOAEL of 4.16 mg/kg-bw/day for ring-necked pheasants: TRV = Genelly and Rudd 1956). Endpoints measured included reproductive success, survival, food consumption, and change in body weight. Kreitzer (1980) observed significant behavioral effects at 0.061 mg/kg-bw/day (error scores - total errors made when exposed to visual stimuli or patterns) of bobwhite quail exposed to endrin for 171 d. Other behavioral endpoints such as reversal and acquisition were not affected. The 74 d NOAEL of 4.16 mg/kg-bw/day was divided by 10 to estimate a chronic NOAEL (TRV). A single oral dose LD_{50} for coturnix quail of 10 mg/kg was also found (Haegele and Tucker 1971). This dose did not cause appreciable egg shell thinning in quail during six days post-treatment. **Used this value with a UF of 10 for the Brown Pelican, American Robin, Marsh Wren, Wood Stork, White Faced Ibis, Reddish Egret, Green Heron, Spotted Sandpiper and Mallard. Used this value with a UF of 100 for the Painted Turtle, Bullfrog, Muskrat, Short-tailed shrew and Raccoon.**

BIS-(2 ETHYLHEXYL)PHTHALATE

Small Mammals: TRV = 13.2 mg/kg-bw/day

This value was based on a 105 d NOAEL of 13.2 mg/kg-bw/day for mice exposed in the diet (Lamb et al. 1987). Endpoints measured included adult fertility, number of litters, number of pups per litter, and proportion of pups born alive (Lamb et al. 1987). The exposure of 100 mg/kg was multiplied by the mass of food consumed per day (0.005 kg) and then divided by the mean weight of exposed mice (0.038 kg) to yield a NOAEL of 13.2 mg/kg-bw/day. A 2 yr (2 generations) NOAEL for rats and a 1 yr NOAEL for guinea pigs of 60.0 mg/kg-bw/day was reported by Carpenter et al. (1953). Endpoints measured included changes in body weights, reproductive success (rats only), liver and kidney weights, and life span (guinea pigs only). Other chronic NOAEL values found for mice and rats ranged from 65 to 200 mg/kg-bw/day (ATSDR, 1991). **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals, Raccoon: TRV = 60.0 mg/kg-bw/day

This TRV was based on a 1 yr NOAEL of 60.0 mg/kg-bw/day for dogs exposed via gelatin capsules (Carpenter et al. 1953). The endpoints examined included growth, liver and kidney weights, and various micropathological (e.g., hepatic and renal) endpoints. A 14 mo LOAEL for ferrets of 800 mg/kg-bw/day was also found based on body weight loss and various hepatic endpoints (Lake et al. 1976). **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

Deer: TRV = 12.0 mg/kg-bw/day

No data were found regarding large mammal exposure to bis-(2 ethylhexyl)phthalate. The deer TRV was extrapolated from the medium mammal TRV of 60 mg/kg-bw/day by dividing by 5 to account for inter-taxon variability.

Chicken/Pheasant and Turkey: TRV = 50.9 mg/kg-bw/day

This TRV was based on a 4 wk LOAEL of 763 mg/kg-bw/day for chickens (Wood and Bitman, 1984). Body weight, liver weight, feed consumption, and egg production were all significantly and adversely affected at this level of exposure. The exposure of 2% (20,000 mg/kg) was multiplied by the mass of DEHP consumed per day per hen (0.145 kg) and then divided by the mean weight of adult hens (3.8 kg-bw) to yield a LOAEL of 763 mg/kg-bw/day. This value was divided by 3 to estimate a chronic LOAEL (254 mg/kg-bw/day) and further divided by 5 to estimate a chronic NOAEL, yielding a TRV of 50.9 mg/kg-bw/day.

Songbirds: TRV = 22.2 mg/kg-bw/day

This value was based on a study examining the effects of phthalate esters on European starlings (O'Shea and Stafford, 1980). Starlings were exposed to 250 mg/kg bis-(2 ethylhexyl) phthalate for 30 days. The dose reported as feed (250 mg/kg) was multiplied by the ingestion rate reported by the authors (0.02 kg/d) and then dividing by the mass of an adult starling (0.75 kg; Terres, 1982) to yield a NOAEL of 66.7 mg/kg-bw/day. The endpoints measured were body weight, feed consumption, and percent lipid content. This value was divided by 3 to estimate a chronic NOAEL, resulting in a TRV of 22.2 mg/kg-bw/day. **Used this value for the Marsh Wren.**

Other Birds: TRV = 10.2 mg/kg-bw/day

No data were found regarding other bird exposure to bis-(2 ethylhexyl)phthalate. This TRV was extrapolated from the chicken TRV of 50.9 mg/kg-bw/day by dividing by 5 to account for inter-taxon variability. **Used this value for the American Robin, Belted Kingfisher, Spotted Sandpiper, Brown Pelican, Green Heron, White-faced Ibis, Wood Stork, Reddish Egret and Mallard.**

DI-N-BUTYL PHTHALATE (DBP)

Small Mammals: TRV = 395 mg/kg-bw/day

This value was based on a 105 d NOAEL of 395 mg/kg-bw/day for mice exposed to DBP in the diet (Lamb et al. 1987). Endpoints included adult fertility, number of litters, number of pups per litter, and proportion of pups born alive. The LOAEL in the same study and endpoints was 1315 mg/kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium and Large Mammals: TRV = 79 mg/kg-bw/day

No data were found for medium or large mammals. The small mammal TRV of 395 mg/kg-bw/day was divided by 5 to account for interspecies extrapolation, resulting in a TRV of 79 mg/kg-bw/day. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

Chicken/Pheasant and Turkey: TRV = 10.2 mg/kg-bw/day

No data were found regarding the exposure of birds to DBP. This TRV was based on a 4 wk LOAEL of 763 mg/kg-bw/day for chickens exposed to bis(2-ethylhexyl) phthalate (DEHP) (Wood and Bitman, 1984). Body weight, liver weight, feed consumption, and egg production were all adversely affected at this level of exposure. The exposure of 2% (20,000 mg/kg) was multiplied by the mass of DEHP consumed per day per hen (0.145 kg) and then divided by the mean weight of adult hens (3.8 kg-bw) to yield a LOAEL of 763 mg/kg-bw/day. This value was divided by 3 to estimate a chronic LOAEL (254 mg/kg-bw/day) and further divided by 5 to estimate a chronic NOAEL, yielding a TRV of 50.9 mg/kg-bw/day. The DEHP value was divided by 5 to estimate a TRV for DBP, yielding a TRV for DBP of 10.2 mg/kg-bw/day. **Used this value for the Brown Pelican, Green Heron, Wood Stork, Reddish Egret, White-faced Ibis, and Mallard with a UF of 10 based on inter-taxon variability.**

Songbirds: TRV = 4.45 mg/kg-bw/day

No data were found regarding the exposure of songbirds to di-n-butyl phthalate. This value was based on a study examining the effects of bis(2-ethylhexyl)phthalate and di-n-hexylphthalate on European starlings (O'Shea and Stafford, 1980). Starlings were exposed to 250 mg/kg of both esters separately for 30 days. The NOAEL dose reported as feed (250 mg/kg) for both esters was multiplied by the ingestion rate reported by the authors (0.02 kg/d) and then dividing by the mass of an adult starling (0.75 kg; Terres, 1982) to yield a NOAEL of 66.7 mg/kg-bw/day. The endpoints measured were body weight, feed consumption, and percent lipid content. This value was divided by 3 to estimate a chronic NOAEL, and further divided by 5 to account for differences between compounds to yield a TRV of 4.45 mg/kg-bw/day. **Used this value for the American Robin, Belted Kingfisher, and Marsh Wren. Used this value for the Spotted Sandpiper with a UF of 10 based on inter-taxon variability.**

ACENAPHTHENE

Small Mammals: TRV = 17.1 mg/kg-bw/day

This value was based on a 10 d NOAEL of 51.4 mg/kg-bw/day for rats (ATSDR 1993). No increase in the liver-to-body-weight ratio was observed at the dose administered. The 10 d NOAEL was divided by 3 to estimate a chronic NOAEL (TRV) of 17.1 mg/kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium and Large Mammals: TRV = 3.4 mg/kg-bw/day

No data were found regarding the toxicity of acenaphthene to medium or large mammals. This value was based on the small mammal TRV of 17.1 mg/kg-bw/day and was divided by 5 to account for inter-taxon variability, resulting in a TRV of 3.4 mg/kg-bw/day. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

Passerine Birds: TRV = 1.01 mg/kg-bw/day

This value was based on a single oral dose for red-winged blackbird of >101 mg/kg-bw (Schafer et al. 1983). The LC_{50} value for blackbird exceeded the highest dose tested (101 mg/kg-bw). The value of 101 mg/kg-bw for red-winged blackbird was divided by a UF of 100 to estimate a chronic NOAEL, resulting in a TRV of 1.01 mg/kg-bw/day. **Used this value for the Belted Kingfisher, American Robin, and Marsh Wren.**

Ducks: TRV = 30.8 mg/kg-bw/day

This value was based on a 7 mo NOAEL of 400 mg/kg in mallards exposed to a mixture of aromatic hydrocarbons, including acenaphthene, acenaphthylene, dimethylnaphthalene, and phenanthrene (Patton and Dieter, 1980). The value of 400 mg/kg feed was multiplied by the amount of feed consumed daily by an adult mallard (0.10 kg; Heinz et al., 1987) and divided by the weight of the adult mallards exposed (1.3 kg) to yield a TRV of 30.8 mg/kg-bw/day. The NOAEL was based on reduced growth, significant enlargement of the liver and testes at the end of the experimental period, and increased hepatic blood flow. However, no outward signs of toxicity were observed. The LOAEL for the same study and endpoints was 4,000 mg/kg or 308 mg/kg-bw/day. **Used this value for the Mallard.**

Other Birds: TRV = 6.2 mg/kg-bw/day

No data were found regarding acenaphthene effects on other birds. The duck TRV of 30.8 mg/kg-bw/day was divided by 5 to account for interspecies extrapolation, resulting in a TRV of

6.2 mg/kg-bw/day. **Used this value for the Brown Pelican, Wood Stork, Reddish Egret, Spotted Sandpiper, Green Heron, and White-faced Ibis.**

ACENAPHTHYLENE

Small Mammals: TRV = 3.4 mg/kg-bw/day Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.

Medium and Large Mammals: TRV = 0.68 mg/kg-bw/day Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.

Passerine Birds: TRV = 0.202 mg/kg-bw/day Used this value for the American Robin, Belted Kingfisher, and Marsh Wren.

Ducks: TRV = 30.8 mg/kg-bw/day Used this value for the Mallard.

Other Birds: TRV = 6.2 mg/kg-bw/day Used this value for the Brown Pelican, White-faced Ibis, Green Heron, Wood Stork, Reddish Egret and Spotted Sandpiper.

No data were found regarding terrestrial or avian (except ducks) receptor exposure to acenaphthylene. Published data indicate a relationship exists between PAH toxicity and molecular weight. As molecular weight of PAHs increases, toxicity also increases (Neff, 1979; Sims and Overcash, 1983), suggesting that PAHs with similar molecular weights possess similar toxicological properties. As such, TRVs for acenaphthylene were extrapolated from TRV values calculated for another PAH (acenaphthene). Acenaphthene was selected as a surrogate for acenaphthylene due to similarities between these PAHs with respect to physical and chemical properties. Both acenaphthylene and acenaphthene have two benzene rings. Both PAHs have similar molecular weights (152 for acenaphthylene and 154 for acenaphthene) and similar octanol-water partition coefficients (log K_{OW} = 4.07 for acenaphthylene and 4.33 for acenaphthene). Data have been provided above regarding the derivation of TRVs for acenaphthene. In all cases, acenaphthylene TRVs were based on acenaphthene TRVs for the various receptor groups but were divided by 5 to account for uncertainty in extrapolating between PAHs.

ANTHRACENE

Small Mammals: TRV = 200 mg/kg-bw/day

This value was based on a 13 wk NOAEL of 1000 mg/kg-bw/day for mice (ATSDR 1995). The endpoint was the absence of tumorigenesis in mice at the end of 13 weeks of exposure. This value was divided by 5 to estimate a chronic NOAEL of 200 mg/kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium and Large Mammals: TRV = 40 mg/kg-bw/day

No data were found regarding anthracene effects on medium or large mammals. This value was based on the small mammal TRV of 200 mg/kg-bw/day and was divided by 5 to account for inter-taxon variability, resulting in a TRV of 40 mg/kg-bw/day. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

Passerine Birds: TRV = 1.11 mg/kg-bw/day

This value was based on a single oral dose for red-winged blackbird of >111 mg/kg-bw (Schafer et al. 1983). A single oral dose of >244 mg/kg-bw was also reported for house sparrow (Schafer et al. 1983). The LC_{50} values for both birds exceeded the highest dose tested (111 mg/kg-bw for blackbird and 244 mg/kg-bw for sparrow). The value of 111 mg/kg-bw for red-winged blackbird was divided by a UF of 100 to estimate a chronic NOAEL, resulting in a TRV of 1.11 mg/kg-bw/day. **Used this value for the American Robin, Marsh Wren, and Belted Kingfisher.**

Other Birds: TRV = 0.22 mg/kg-bw/day

No data were found regarding anthracene effects on other birds. This value was based on the passerine bird TRV of 1.11 mg/kg-bw/day and was divided by 5 to account for inter-taxon variability, resulting in a TRV of 0.22 mg/kg-bw/day. **Used this value for the Green Heron, White-faced Ibis, Mallard, Wood Stork, Reddish Egret, Spotted Sandpiper, and Brown Pelican.**

BENZ[A]ANTHRACENE

Small Mammals: TRV = 0.10 mg/kg-bw/day

This value was based on a 5 wk LOAEL of 1.5 mg/kg-bw/day for mice exposed to benz[a]anthracene via intermittent oral gavage doses (ATSDR 1993). Exposed mice showed substantially elevated incidences of hepatomas and lung adenomas following up to 60 days of observation. This value was divided by 3 to estimate a chronic LOAEL and further divided by 5 to estimate a chronic NOAEL, resulting in a TRV of 0.10 mg/kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability. Used this value for the Belted Kingfisher with a UF of 10 for aves/mammalian variability.**

Medium and Large Mammals: TRV = 0.02 mg/kg-bw/day

No data were found concerning benz[a]anthracene toxicity to medium or large mammals. This TRV was based on the small mammal TRV of 0.10 mg/kg-bw/day and was divided by 5 to account for inter-taxon variability, resulting in a TRV of 0.02 mg/kg-bw/day. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability. Used this value for the American Robin, Marsh Wren, Green Heron, Wood Stork, Reddish Egret, White-faced Ibis, Mallard, Brown Pelican, and Spotted Sandpiper with a UF of 100 based on aves/mammalian variability.**

All Birds (ND)

No data were found regarding benz[a]anthracene toxicity to birds.

BENZO[A]PYRENE

Small Mammals: TRV = 0.67 mg/kg-bw/day

This value was based on a 9 d LOAEL of 10 mg/kg-bw/day for mice exposed to benzo[a]pyrene in the diet (Mackenzie and Angevine 1981). Mice were dosed daily on days 7-16 of gestation via oral intubation. Significant effects were noted at the LOAEL on pup weights, mean litter size, and fertility indices for F_1 males and females mated with untreated mice. The LOAEL was divided by 3 to estimate a chronic LOAEL (3.33 mg/kg-bw/day) and further divided by 5 to estimate a NOAEL of 0.67 mg/kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability. Used this value for the Belted Kingfisher with a UF of 10 based on aves/mammalian variability.**

Medium and Large Mammals: TRV = 0.13 mg/kg-bw/day

No data were found regarding medium and large mammal exposure to benzo[a]pyrene. The small mammal TRV of 0.67 mg/kg-bw/day was divided by 5 to account for interspecies extrapolation. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability. Used this value for the American Robin, Marsh Wren, Brown Pelican, Green Heron, Wood Stork, Reddish Egret, White-faced Ibis, Mallard, and Spotted Sandpiper with a UF of 100 based on aves/mammalian variability.**

All Birds (ND)

No data were found regarding bird exposure to benzo[a]pyrene.

BENZO[B]FLUORANTHENE

Small Mammals: TRV = 4.0 mg/kg-bw/day

This value was based on a chronic oral carcinogenicity value of 40.0 mg/kg-bw/day for rodents (Sims and Overcash, 1983). The test duration and effects monitored were not provided. This value was divided by 10 to estimate a chronic NOAEL. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability. Used this value for the Belted Kingfisher with a UF of 100 based on aves/mammalian variability.**

Medium and Large Mammals: TRV = 0.8 mg/kg-bw/day

No data were found concerning benzo[b]fluoranthene exposure to medium or large mammals. The TRV was based on the small mammal value and was divided by 5 to account for intertaxon variability. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability. Used this value for the American Robin, Marsh Wren, Green Heron, Wood Stork, Reddish Egret, White-faced Ibis, Brown Pelican, Spotted Sandpiper, and Mallard with a UF of 100 based on aves/mammalian variability.**

All Birds (ND)

No data were found regarding benzo[b]fluoranthene toxicity to birds.

BENZO[K]FLUORANTHENE

Small Mammals: TRV = 7.2 mg/kg-bw/day

This value was based on a chronic oral carcinogenicity value of 72.0 mg/kg-bw/day for rodents (Sims and Overcash, 1983). The test duration and effects monitored were not provided. This value was divided by 10 to estimate a chronic NOAEL. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability. Used this value for the Belted Kingfisher with a UF of 10 based on aves/mammalian variability.**

Medium and Large Mammals: TRV = 1.44 mg/kg-bw/day

No data were found concerning benzo[b]fluoranthene exposure to medium or large mammals. This value was based on the small mammal TRV of 7.2 mg/kg-bw/day and was divided by 5 to account for intertaxon variability. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability. Used this value for the American Robin, Wood Stork, Reddish Egret, Marsh Wren, White-faced Ibis, Brown Pelican, Spotted Sandpiper, Green Heron, and Mallard with a UF of 100 based on aves/mammalian variability.**

All Birds (ND)

No data were found regarding benzo[k]fluoranthene toxicity to birds.

BENZO[G,H,I]PERYLENE

Small Mammals: TRV = 0.13 mg/kg-bw/day

Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability. Used this value for the Belted Kingfisher with a UF of 100 based on aves/mammalian variability.

Medium Mammals: TRV = 0.03 mg/kg-bw/day

Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability. Used this value for the American Robin, Marsh Wren, White-faced Ibis, Brown Pelican, Spotted Sandpiper, Wood Stork, Reddish Egret, Green Heron, and Mallard with a UF of 100 based on aves/mammalian variability.

All Birds: TRV = No data

No data were found regarding terrestrial or avian receptor exposure to benzo[g,h,i]perylene. Published data indicate a relationship exists between PAH toxicity and molecular weight. As molecular weight of PAHs increases, toxicity also increases (Neff, 1979; Sims and Overcash, 1983), suggesting that PAHs with similar molecular weights possess similar toxicological properties. As such, TRVs for benzo[g,h,i]perylene were extrapolated from TRV values calculated for another PAH (benzo[a]pyrene). Benzo[a]pyrene was selected as a surrogate for benzo[g,h,i]perylene due to similarities between these PAHs with respect to physical and chemical properties. Benzo[g,h,i]perylene has six benzene rings and benzo[a]pyrene has five benzene rings. Both PAHs have similar molecular weights (276 for benzo[g,h,i]perylene and 252 for benzo[a]pyrene) and similar octanol-water partition coefficients (log K_{OW} = 7.23 for benzo[g,h,i]perylene and 6.04 for benzo[a]pyrene). Data have been provided above regarding the derivation of TRVs for benzo[a]pyrene. In most cases, benzo[g,h,i]perylene TRVs were based on benzo[a]pyrene TRVs for the various receptor groups but were divided by 5 to account for uncertainty in extrapolating between PAHs. For mallards the benzo[a]pyrene TRV was divided by 50.

CHRYSENE

Small Mammals: TRV = 9.9 mg/kg-bw/day

This value was based on a chronic oral carcinogenicity value of 99.0 mg/kg-bw/day for rodents reported by Sims and Overcash (1983). The test duration and effects monitored were not provided. This value was divided by 10 to estimate a chronic NOAEL. **Used this value for the Short-tailed Shrew. Used this value for Green Heron and White-faced Ibis. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability. Used this value for the Belted Kingfisher with a UF of 10 based on aves/mammalian variability.**

Medium and Large Mammals: TRV = 1.98 mg/kg-bw/day

No data were found regarding medium and large mammal exposure to chrysene. The small mammal TRV of 9.9 mg/kg-bw/day was divided by 5 for interspecies extrapolation, resulting in a TRV of 1.98 mg/kg-bw/day. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability. Used this value for the American Robin, Marsh Wren, Brown Pelican, Spotted Sandpiper, Wood Stork, Reddish Egret and Mallard with a UF of 100 based on aves/mammalian variability.**

All Birds (ND)

No data were found regarding bird exposure to chrysene.

DIBENZ[A,H]ANTHRACENE

Small Mammals: TRV = 17.1 mg/kg-bw/day

This value was based on a 10 d NOAEL of 51.4 mg/kg-bw/day for rats (ATSDR 1995). No increase in the liver-to-body-weight ratio was observed at the dose administered. The 10 d NOAEL was divided by 3 to estimate a chronic NOAEL (TRV) of 17.1 mg/kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability. Used this value for the Belted Kingfisher with a UF of 10 based on aves/mammalian variability.**

Medium and Large Mammals: TRV = 3.4 mg/kg-bw/day

No data were found regarding dibenz[a,h]anthracene effects on medium or large mammals. This value was based on the small mammal TRV of 17.1 mg/kg-bw/day and was divided by 5 to account for intertaxon variability, resulting in a TRV of 3.4 mg/kg-bw/day. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability. Used this value for the American Robin, Marsh Wren, White-faced Ibis, Brown Pelican, Wood Stork, Reddish Egret, Spotted Sandpiper, Green Heron, and Mallard with a UF of 100 based on aves/mammalian variability.**

All Birds (ND)

No data were found regarding the exposure of birds to dibenz[a,h]anthracene.

FLUORANTHENE

Small Mammals: TRV = 100 mg/kg-bw/day

This value was based on a 13 wk NOAEL of 500 mg/kg-bw/day for mice (ATSDR 1995). The endpoint was the absence of tumorigenesis at necropsy. This value was divided by 5 to estimate a chronic NOAEL of 100 mg/kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability. Used this value for the Belted Kingfisher with a UF of 10 based on aves/mammalian variability.**

Medium and Large Mammals: TRV = 20 mg/kg-bw/day

No data were found regarding fluoranthene toxicity to medium or large mammals. This TRV was based on the small mammal value of 100 mg/kg-bw/day and was divided by 5 to account for intertaxon variability. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability. Used this value for the American Robin, Marsh Wren, White-faced Ibis, Wood Stork, Reddish Egret, Brown Pelican, Spotted Sandpiper, Green Heron, and Mallard with a UF of 100 based on aves/mammalian variability.**

All Birds (ND)

No data were found regarding the exposure of birds to fluoranthene.

FLUORENE

Small Mammals: TRV = 100 mg/kg-bw/day

This value was based on a 13 wk NOAEL of 500 mg/kg-bw/day for mice (ATSDR 1995). The endpoint was the absence of tumorigenesis at necropsy. This value was divided by 5 to estimate a chronic NOAEL of 100 mg/kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium and Large Mammals: TRV = 20 mg/kg-bw/day

No data were found regarding fluoranthene toxicity to medium or large mammals. This TRV was based on the small mammal value of 100 mg/kg-bw/day and was divided by 5 to account for intertaxon variability. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

Passerine Birds: TRV = 1.01 mg/kg-bw/day

This value was based on a single oral dose for red-winged blackbirds of >101 mg/kg-bw (Schafer et al. 1983). The LC_{50} value for blackbirds exceeded 101 mg/kg-bw, which was the highest dose tested. The value of 101 mg/kg-bw for red-winged blackbird was divided by a UF of 100 to estimate a chronic NOAEL, resulting in a TRV of 1.01 mg/kg-bw/day. **Used this value for the American Robin, Belted Kingfisher, and Marsh Wren.**

Other Birds: TRV = 0.202 mg/kg-bw/day

No data were found regarding fluorene effects on other birds. This value was based on the passerine bird TRV of 1.01 mg/kg-bw/day and was divided by 5 to account for intertaxon variability, resulting in a TRV of 0.202 mg/kg-bw/day. **Used this value for the Brown Pelican, Green Heron, White-faced Ibis, Spotted Sandpiper, Wood Stork, Reddish Egret and Mallard.**

INDENO[1,2,3-CD]PYRENE

Small Mammals: TRV = 0.13 mg/kg-bw/day

Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability. Used this value for the Belted Kingfisher with a UF of 100 based on aves/mammalian variability.

Medium Mammals: TRV = 0.03 mg/kg-bw/day

Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability. Used this value for the American Robin, Marsh Wren, White-faced Ibis, Brown Pelican, Wood Stork, Reddish Egret, Spotted Sandpiper, Green Heron, and Mallard with a UF of 100 based on aves/mammalian variability.

All Birds (ND)

No data were found regarding terrestrial or avian receptor exposure to indeno[1,2,3-cd]pyrene. Published data indicate a relationship exists between PAH toxicity and molecular weight. As molecular weight of PAHs increases, toxicity also increases (Neff, 1979; Sims and Overcash, 1983), suggesting that PAHs with similar molecular weights possess similar toxicological properties. As such, TRVs for indeno[1,2,3-cd]pyrene were extrapolated from TRV values calculated for another PAH (benzo[a]pyrene). Benzo[a]pyrene was selected as a surrogate for indeno[1,2,3-cd]pyrene due to similarities between these PAHs with respect to physical and chemical properties. Indeno[1,2,3-cd]pyrene has five benzene rings and benzo[a]pyrene has five benzene rings. Both PAHs have similar molecular weights (276 for indeno[1,2,3-cd]pyrene and 252 for benzo[a]pyrene) and similar octanol-water partition coefficients (log K_{OW} = 6.51 for indeno[1,2,3-cd]pyrene and 6.04 for benzo[a]pyrene). Data have been provided above regarding the derivation of TRVs for benzo[a]pyrene. In all cases, indeno[1,2,3-cd]pyrene TRVs were based on benzo[a]pyrene TRVs for the various receptor groups but were divided by 5 to account for uncertainty due to extrapolation between PAHs.

NAPHTHALENE

Small Mammals: TRV = 18.3 mg/kg-bw/day

This value was based on a 90 d NOAEL of 18.3 mg/kg-bw/day for mice (Shopp et al. 1984). Mortality, overall body weight, and several immunotoxicity endpoints were not significantly affected at the NOAEL (133 mg/kg). The value of 133 mg/kg feed was multiplied by the amount of dry feed consumed daily by a mouse (0.0045 kg; Nagy, 1987) and divided by the average weight of mice at test termination (0.0327 kg) to yield a TRV of 18.3 mg/kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium and Large Mammals: TRV = 17.5 mg/kg-bw/day

This value was based on the only value found regarding naphthalene toxicity to medium mammals (Zuelzer and Apt 1949). Dogs were exposed to naphthalene for 7 days at a mean daily dose of 263 mg/kg-bw/day in the diet. Lethargy, ataxia, diarrhea, and hemolytic anemia were affected at this LOAEL dose. This LOAEL value was divided by 3 to estimate a chronic LOAEL (87.7 mg/kg-bw/day) and further divided by 5 to estimate a NOAEL, resulting in a TRV of 17.5 mg/kg-bw/day. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

Ducks: TRV = 30.8 mg/kg-bw/day

This value was based on a 7 mo NOAEL of 400 mg/kg in mallards exposed to a mixture of aromatic hydrocarbons, including acenaphthene, acenaphthylene, dimethylnaphthalene, and phenanthrene (Patton and Dieter, 1980). The value of 400 mg/kg feed was multiplied by the amount of feed consumed daily by an adult mallard (0.10 kg; Heinz et al., 1987) and divided by the weight of the adult mallards exposed (1.3 kg) to yield a TRV of 30.8 mg/kg-bw/day. The NOAEL was based on reduced growth, significant enlargement of the liver and testes at the end of the experimental period, and increased hepatic blood flow. However, no outward signs of toxicity were observed. The LOAEL for the same study and endpoints was 4,000 mg/kg or 308 mg/kg-bw/day. **Used this value for the Mallard.**

Other Birds: TRV = 6.2 mg/kg-bw/day

No data were found regarding the exposure of other birds to naphthalene. This value was based on the TRV for ducks of 30.8 mg/kg-bw/day. This value was divided by 5 to account for intertaxon variation, resulting in a TRV of 6.2 mg/kg-bw/day. **Used this value for the**

American Robin, Belted Kingfisher, Marsh Wren, Wood Stork, Reddish Egret, Green Heron, White-faced Ibis, Spotted Sandpiper, and Brown Pelican.

2-METHYLNAPHTHALENE

Small Mammals: TRV = 3.66 mg/kg-bw/day

Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.

Medium Mammals: TRV = 3.5 mg/kg-bw/day

Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.

Ducks: TRV = 6.2 mg/kg-bw/day

Used this value for the Mallard.

All Other Birds: TRV = 1.2 mg/kg-bw/day

Used this value for the American Robin, Belted Kingfisher, Marsh Wren, Green Heron, White-faced Ibis, Wood Stork, Reddish Egret, Spotted Sandpiper, and Brown Pelican.

No data were found regarding terrestrial or avian receptor exposure to 2-methylnaphthalene. Published data indicate a relationship exists between PAH toxicity and molecular weight. As molecular weight of PAHs increases, toxicity also increases (Neff, 1979; Sims and Overcash, 1983), suggesting that PAHs with similar molecular weights possess similar toxicological properties. As such, TRVs for 2-methylnaphthalene were extrapolated from TRV values calculated for another PAH (naphthalene). Naphthalene was selected as a surrogate for 2-methylnaphthalene due to similarities between these PAHs with respect to physical and chemical properties. Both PAHs have two benzene rings and have similar molecular weights (142 for 2-methylnaphthalene and 128 for naphthalene). Data have been provided above regarding the derivation of TRVs for naphthalene. In all cases, 2-methylnaphthalene TRVs were based on naphthalene TRVs for the various receptor groups but were divided by 5 to account for uncertainty in extrapolating between PAHs.

PHENANTHRENE

Small Mammals: TRV = 171 mg/kg-bw/day

This value was based on a 10 d NOAEL of 514 mg/kg-bw/day in rats (ATSDR 1995). No increase in the liver-to-body-weight ratio was observed at the dose administered. The 10 d NOAEL was divided by 3 to estimate a chronic NOAEL (TRV) of 171 mg/kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium and Large Mammals: TRV = 34.2 mg/kg-bw/day

No data were found regarding the exposure of medium or large mammals to phenanthrene. This value was based on the small mammal value of 171 mg/kg-bw/day and was divided by 5 to account for inter-taxon variability, resulting in a TRV of 34.2 mg/kg-bw/day. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

Ducks: TRV = 30.8 mg/kg-bw/day

This value was based on a 7 mo NOAEL of 400 mg/kg in mallards exposed to a mixture of aromatic hydrocarbons, including acenaphthene, acenaphthylene, dimethylnaphthalene, and phenanthrene (Patton and Dieter, 1980). The value of 400 mg/kg feed was multiplied by the amount of feed consumed daily by an adult mallard (0.10 kg; Heinz et al., 1987) and divided by the weight of the adult mallards exposed (1.3 kg) to yield a TRV of 30.8 mg/kg-bw/day. The NOAEL was based on reduced growth, significant enlargement of the liver and testes at the end of the experimental period, and increased hepatic blood flow. However, no outward signs of toxicity were observed. The LOAEL for the same study and endpoints was 4,000 mg/kg or 308 mg/kg-bw/day. **Used this value for the Mallard.**

Other Birds: TRV = 6.2 mg/kg-bw/day

No data were found regarding the exposure of birds to phenanthrene. This value was based on the duck value of 30.8 mg/kg-bw/day and was divided by 5 to account for inter-taxon variability, resulting in a TRV of 6.2 mg/kg-bw/day. **Used this value for the Green Heron, Wood Stork, Reddish Egret, White-faced Ibis, Spotted Sandpiper, and the Brown Pelican.**

Passerine Birds: TRV = 1.13 mg/kg-bw/day

This value was based on a single oral dose for red-winged blackbirds of >113 mg/kg-bw (Schafer et al. 1983). The LC_{50} value for blackbird exceeded 113 mg/kg-bw, which was the highest dose tested. The value of 113 mg/kg-bw for red-winged blackbird was divided by a UF of 100 to estimate a chronic NOAEL, resulting in a TRV of 1.13 mg/kg-bw/day. **Used this value for the American Robin, Belted Kingfisher, and Marsh Wren.**

PYRENE

Small Mammals: TRV = 171 mg/kg-bw/day

This value was based on a 10 d NOAEL of 514 mg/kg-bw/day in rats (ATSDR 1995). No increase in liver weights were observed at the dose administered. The 10 d NOAEL was divided by 3 to estimate a chronic NOAEL (TRV) of 171 mg/kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability. Used this value for the Belted Kingfisher with a UF of 10 based on aves/mammalian variability.**

Medium and Large Mammals: TRV = 34.3 mg/kg-bw/day

No data were found regarding pyrene effects on medium or large mammals. This value was based on the small mammal TRV of 171 mg/kg-bw/day and was divided by 5 to account for intertaxon variability, resulting in a TRV of 34.3 mg/kg-bw/day. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability. Used this value for the American Robin, Marsh Wren, White-faced Ibis, Brown Pelican, Spotted Sandpiper, Wood Stork, Reddish Egret, Green Heron, and Mallard with a UF of 100 based on aves/mammalian variability.**

All Birds (ND)

No data were found regarding avian receptor exposure to pyrene.

TOTAL PAHs

All Birds: TRV = 54.5 mg/kg-bw/day

This value was based on a 7 mo LOAEL of 4,000 mg/kg in mallards (Eisler, 1987). Mallards were fed a mixture of PAHs, mostly as naphthalenes, naphthenes, and phenanthrene. The value of 4,000 mg/kg feed was multiplied by the amount of dry feed consumed daily by an adult mallard (0.15 kg; Welty, 1982) and divided by the weight of an adult mallard (2.4 lb or 1.1 kg; Terres, 1982) to yield a TRV of 545 mg/kg-bw/day. The endpoint was presence of liver abnormalities. This LOAEL was divided by 10 to estimate a chronic NOAEL of 54.5 mg/kg-bw/day. **Used this value for the Brown Pelican, Spotted Sandpiper and Marsh Wren. Used this value with a UF of 100 for White-faced Ibis.**

Mallard, Heron, Kingfisher, Robin: TRV = 0.71 mg/kg-bw/day

This value was based on a 22 week NOAEL of 20,000 mg/kg diet of naturally weathered Exxon Valdez crude oil dosed to mallard ducks via oral gavage (Stubblefield et al. 1995a). This NOAEL was based on adult survival, growth, and food consumption, and 14 reproductive endpoints, including total eggs laid, percent viability of fertile eggs set, and percent survival of 14 day-old offspring. The TRV was calculated by summing the detected concentrations of individual PAHs pertinent to this study (Naph, Flu, Phen, Pyr, Chry, BkF, and BaP; as presented in Stubblefield et al. 1995b) to equal 322 mg total PAH/kg oil. This value was divided by the 0.02 kg of oil dosed to the ducks (20,000 mg), multiplied by the average feed consumed by ducks at the NOAEL dose (0.1325 kg/d), and then divided by the average body weight of ducks dosed (1.2 kg-bw) to yield 0.71 mg/kg-bw/day. This TRV is a highly conservative estimate of a NOAEL dose for total PAH because 1) no reproductive effects were observed at the highest dose tested, and 2) five PAHs (Acen, Anth, Flu, Indp, and DbA) had non-detected concentrations and did not contribute to the total PAH calculation, hence greatly reducing the TPAH concentration and the resultant TRV. Because of this conservatism, no uncertainty factors were applied to this TRV to extrapolate to other bird ROIs. **Used this value for the Mallard, Green Heron, Wood Stork, Reddish Egret, Belted Kingfisher, and American Robin. Used this value for the Muskrat, Raccoon, and Short-tailed Shrew with a UF of 100 based on mammalian/aves variability. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability. Used this value for the Painted Turtle with a UF of 100 based on reptilian/mammalian variability.**

TOTAL PCB

Total PCB - Medium Mammals: TRV = 0.0134 mg/kg-bw/day

This value was based on a 182 d LOAEL of 0.134 mg/kg-bw/day for mink fed PCB-contaminated carp from the Saginaw Bay, Michigan (Heaton et al. 1995). The LOAEL was based on significant reductions in adult female body weights, and kit body weight and survival at 3 and 6 wk of age. The LOAEL was divided by 10 to estimate a chronic NOAEL, resulting in a TRV of 0.0134 mg/kg-bw/day. **Used this value for short-tailed shrew. Used an uncertainty factor of 100 for Reddish Egret, Brown Pelican, Bullfrog, Mallard, Green Heron, Wood Stork, White-faced Ibis, Belted Kingfisher, Painted turtle, Spotted Sandpiper, marsh wren, American Robin, raccoon, and muskrat.**

Aroclor 1016 - Small Mammals (ND)

No data were found regarding the exposure of small mammals to Aroclor 1016.

Aroclor 1016 - Medium Mammals: TRV = 3.0 mg/kg-bw/day

This value was based on the study by Ringer et al. (1981) who reported a 247 d NOAEL of 3.00 mg/kg-bw/day (20 mg/kg feed) for mink and a 247 d NOAEL of 3.0 mg/kg-bw/day for ferrets based on adult mortality, number mated, number whelped, and survival and weights of kits. The NOAEL reported as 2 mg/kg feed was multiplied by the estimated daily intake of female mink reported by the authors (0.15 kg/d) and then divided by the mass of adult female mink used (1.0 kg-bw) to yield a TRV of 3.0 mg/kg-bw/day. A 10 mo NOAEL of 0.30 mg/kg-bw/day for mink was also reported by Aulerich and Ringer (1977). The NOAEL reported as 2 mg/kg feed was multiplied by the estimated daily intake of female mink reported by the authors (0.15 kg/d) and then divided by the mass of adult female mink used (1.0 kg-bw) to yield a TRV of 0.30 mg/kg-bw/day. The endpoints measured included mortality, number mated, number whelped, and survival and weights of kits. The Aulerich and Ringer (1977) value is considered conservative as it was the only dose administered (2.0 mg/kg). Bleavins et al. (1980) reported a 247 d LOAEL of 3.75 mg/kg-bw/day (5 mg/kg feed) for mink and a 247 d NOAEL of 3.00 mg/kg-bw/day for ferrets. Mink appear to be more sensitive than ferrets to Aroclor 1016 exposure**. Used for muskrat and raccoon. Used for Short-tailed shrew with a UF of 10. Used for Bullfrog, Painted Turtle, Belted Kingfisher, American Robin, Brown Pelican, Marsh Wren, Wood Stork, White Faced Ibis, Reddish Egret, Green Heron, Mallard, and Spotted Sandpiper with a UF of 100.**

AROCLOR 1242

Small Mammals: TRV = 0.46 mg/kg-bw/day

This value was based on a 36 wk NOAEL of 4.6 mg/kg-bw/day for rats (Jonsson et al. 1976). No significant effects on mating, reproductive success, and plasma progesterone concentrations were observed at the NOAEL. A 6 mo LOAEL of 0.225 mg/kg-bw/day (5 mg/kg feed) for rats was reported by Bruckner et al. (1973a) based on changes in a variety of histopathological endpoints. The LOAEL expressed as 5 mg/kg diet was multiplied by the estimated food consumption rate of 0.018 kg/d (Nagy, 1987) and then divided by the average mass of the rats studied (0.40 kg), resulting in a TRV of 0.225 mg/kg-bw/day. This value was not used as the TRV because none of the effects measured were life threatening. Also found was a 14 d oral LD50 value of 4,250 mg/kg for rats reported by Bruckner et al. (1973b), and an acute oral LD50 of 8,650 mg/kg for rats reported by Fishbein (1974). The NOAEL by Jonsson et al. (1976) was reduced by a factor of 10 to estimate a chronic NOAEL (0.46 mg/kg-bw/day). **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals: TRV = 0.094 mg/kg-bw/day

This value was based on a 247 d LOAEL of 0.94 mg/kg-bw/day for mink reported by Bleavins et al. (1980). The LOAEL reported as 5 mg/kg feed was multiplied by the estimated daily intake of female mink reported by the authors (0.15 kg/d) and then divided by the mass of adult female mink used (0.80 kg-bw) to yield a LOAEL of 0.94 mg/kg-bw/day. The endpoints measured included mortality, number mated, number whelped, and survival and weights of kits. This value was divided by 10 to estimate a chronic NOAEL of 0.094 mg/kg-bw/day. Bleavins et al. (1980) also reported a 247 d LOAEL of 3.00 mg/kg-bw/day (20 mg/kg) for ferrets. Endpoints measured were the same as those measured in the mink experiment. Aulerich and Ringer (1977) reported a 10 mo NOAEL of 0.30 mg/kg-bw/day (2 mg/kg feed) for mink. This value was not used because there was only one dose administered (2.0 mg/kg), whereas in the Bleavins et al. (1980) study four doses were administered. Nevertheless, the TRV appears conservative based on the data obtained. Mink appear more sensitive than ferrets to Aroclor 1242. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

Chickens/Pheasants and Turkeys: TRV = 0.24 mg/kg-bw/day

This value was based on a 6 wk NOAEL of 0.24 mg/kg-bw/day (5 mg/kg feed) for adult domestic hens (Britton and Huston 1973). No effects on adult survival, or egg hatchability, egg production, egg weight and thickness were observed at the NOAEL. The value of 5 mg/kg feed was multiplied by the average amount of dry feed consumed daily by adult hens (0.85 kg/d; Nagy, 1987) and divided by the weight of adult hens (1.8 kg; Welty 1982) to yield a NOAEL of 0.24 mg/kg-bw/day. A 45 d NOAEL of 1.2 mg/kg-bw/day for Japanese quail was also found

(Hill et al. 1976). The value reported by Hill et al. (1976) of 10.0 mg/kg feed was multiplied by the average amount of dry feed consumed daily by Japanese quail (12% of body weight; Nagy, 1987) and divided by the weight of adult Japanese quail (180 g; Terres 1982) to yield a NOAEL of 1.2 mg/kg-bw/day. The endpoints were based on mortality, reproductive success, and egg shell thickness. Five day LC50 values were reported for ring-necked pheasant, bobwhite quail, and Japanese quail exposed to Aroclor 1242 (Heath et al. 1972). Five day LD50 values of 2,080 mg/kg, 2,100 mg/kg, and >5,000 mg/kg were reported for ring-necked pheasant, bobwhite quail, and Japanese quail, respectively (Heath et al. 1972). **Used this value for the American Robin, and Marsh Wren with a UF of 10 based in inter-taxon variability.**

Herons and Ducks: TRV = 1.88 mg/kg-bw/day

This value was based on a 12 wk LOAEL of 18.75 mg/kg-bw/day for adult mallards (Haseltine and Prouty, 1980). The value reported by Haseltine and Prouty (1980) of 150 mg/kg feed was multiplied by the average amount of dry feed consumed daily by an adult mallard (0.15 kg; Welty, 1982) and divided by the weight of adult mallards exposed (1.2 kg) to yield a NOAEL of 18.75 mg/kg-bw/day. The endpoints were based on mortality, changes in body weight, and reproductive performance. A 5 d LC50 value of 3,180 mg/kg was also reported for mallards exposed to Aroclor 1242 (Heath et al. 1972). The Haseltine and Prouty (1980) value of 18.75 mg/kg-bw/day was divided by 10 to estimate a chronic NOAEL of 1.88 mg/kg-bw/day. **Used this value for the Mallard, Green Heron, Wood Stork, Reddish Egret and White-faced Ibis. Used this value for the Belted Kingfisher and Spotted Sandpiper with a UF of 10 based on inter-taxon variability.**

AROCLOR 1248

Small Mammals: TRV = 2.6 mg/kg-bw/day

This value was based on a 5 wk LOAEL of 13 mg/kg-bw/day for mice exposed to Aroclor 1248 (ATSDR 1991). After 5 weeks of exposure, mice at the LOAEL had decreased resistance to infection, resulting in increased mortality. This value was divided by a factor of 5 to estimate a chronic NOAEL, resulting in a TRV of 2.6 mg/kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals: TRV = 0.52 mg/kg-bw/day

No data were found regarding medium mammal exposure to Aroclor 1248. This value was based on the Aroclor 1248 TRV for small mammals of 2.6 mg/kg-bw/day and divided by 5 to account for species extrapolation, resulting in a TRV of 0.52 mg/kg-bw/day for medium mammals. **Used this value for the Muskrat. Used this value with a UF of 10 for the raccoon. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

Chickens/Pheasants and Turkeys: TRV = 0.056 mg/kg-bw/day

This value was based on an 8 wk NOAEL of 0.056 mg/kg-bw/day for domestic chickens (Scott, 1977). The NOAEL reported as 1.0 mg/kg dietary feed was multiplied by the daily consumption of chickens tested (0.100 kg/d) and then divided by the estimated body weight of adult chicken (180 g; Terres, 1982) to yield a NOAEL of 0.056 mg/kg-bw/day. Endpoints measured included survival, egg production, eggshell breaking strength and egg hatchability.

Ducks: TRV = 5.58 mg/kg-bw/day

This value was based on a 5 d LC50 value of 2,795 mg/kg reported for mallards exposed to Aroclor 1248 (Heath et al. 1972). This value was divided by 100 to estimate a chronic NOAEL and further divided by 5 to account for inter-taxon variability, resulting in a TRV of 5.58 mg/kg-bw/day. **Used this value for the Mallard.**

Raptors: TRV = 0.45 mg/kg-bw/day

This value was based on a 1.5 yr NOAEL of 0.45 mg/kg-bw/day for screech owls (McLane and Hughes, 1980). The NOAEL reported as 3 mg/kg dietary feed was multiplied by the estimated daily consumption of screech owls (15% of body wt.; Nagy, 1987) and then divided by the estimated body weight of adult screech owls (150 g; Terres, 1982) to yield a NOAEL of 0.45 mg/kg-bw/day. The exposure encompassed two full breeding seasons and the endpoints measured included survival, egg production, egg hatchability, and eggshell thickness. It should be noted that 3.0 mg/kg was the only dose administered (plus controls) to the owls, thus the estimated NOAEL value obtained is likely conservative.

Waterbirds, Passerine Birds: TRV = 0.09 mg/kg-bw/day

No data were found regarding other bird exposure to Aroclor 1248. This value was based on the TRV for raptors of 0.45 mg/kg-bw/day, the most rigorous study examining the effects of Aroclor 1248 on birds (e.g., chronic NOAEL reported). The raptor TRV was divided by 5 to account for inter-taxon variability, resulting in a TRV of 0.09 mg/kg-bw/day. **Used this value for the American Robin, Belted Kingfisher, Green Heron, Wood Stork, Reddish Egret, White-faced Ibis, Marsh Wren, Brown Pelican, and Spotted Sandpiper**

AROCLOR 1254

Small Mammals: TRV = 0.32 mg/kg-bw/day

This value was based on a two generation study reporting a NOAEL of 0.32 mg/kg-bw/day for rats (Linder et al. 1974). The NOAEL was based on several reproductive endpoints, including number of litters, litter size, total pups per treatment group, pup survival, and mean body weight at weaning. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals: TRV = 0.073 mg/kg-bw/day

This value was based on a 250 d NOAEL of 0.073 mg/kg-bw/day for mink fed PCB-contaminated whitefish racks (Hornshaw et al. 1983). The NOAEL was based on percentage of females whelped, number of kits born, kits per female, and kit survival. The NOAEL was the highest dose tested that was below reported LOAEL values (Hornshaw et al. 1983). These LOAEL values were 0.23 mg/kg-bw/day for mink fed PCB-contaminated carp (250 d) and 0.10 mg/kg-bw/day for mink fed PCB-contaminated perch scraps and sucker (290 d). The total dietary PCB intake of 18.0 mg Aroclor 1254 reported was divided by days of exposure (250 d) and then divided by the body weight of female mink tested (0.99 kg) to yield 0.073 mg/kg-bw/day. This was the lowest NOAEL found for mink exposed to Aroclor 1254. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

Songbirds: TRV = 4.8 mg/kg-bw/day

This value was based on a 56 d NOAEL of 24.0 mg/kg-bw/day for Bengalese finches exposed to Aroclor 1254 (Prestt et al. 1970). The endpoints were mortality and body weight loss. The NOAEL value of 24 mg/kg-bw/day was reduced by a factor of 5 to yield a TRV of 4.8 mg/kg-bw/day. **Used for American Robin and Marsh Wren with a UF of 2000.**

Herons and Ducks: TRV = 1.41 mg/kg-bw/day

This value was based on a 1.5 yr (2 generation) NOAEL of 1.41 mg/kg-bw/day for mallards exposed to Aroclor 1254 (Heath et al. 1972). The exposure encompassed two full breeding seasons, with the NOAEL based on mortality and several reproductive endpoints. The value reported by Heath et al. (1972) of 25 mg/kg feed was multiplied by the average amount of dry feed consumed daily by an adult mallard (0.062 kg/d; Nagy, 1987) and divided by the weight of an adult mallard (1.1 kg; Terres, 1982) to yield a NOAEL of 1.41 mg/kg-bw/day. **Used this**

value for the Mallard, Green Heron, White-faced Ibis,Wood Stork, Reddish Egret and Brown Pelican. Used this value for the Spotted Sandpiper and Belted Kingfisher with a UF of 10 based on inter-taxon variability.

Chickens/Pheasants and Turkeys: TRV = 0.024 mg/kg-bw/day

This value was based on a 39 wk LOAEL of 0.24 mg/kg-bw/day for adult domestic chickens exposed to Aroclor 1254 (Platonow and Reinhart 1973). Significant effects on mean hen day production and egg fertility were observed at the LOAEL. The Platonow and Reinhart (1973) value of 0.24 mg/kg-bw/day was divided by a UF of 10 to estimate a chronic NOAEL, resulting in a TRV of 0.024 mg/kg-bw/day.

Raptors: TRV = 0.90 mg/kg-bw/day

This value was based on a 62-69 d LOAEL of 9-10 mg/kg-bw/day for adult American kestrels exposed to Aroclor 1254 (Bird et al. 1983). The LOAEL was based on sperm concentration and sperm numbers per ejaculate. This value was divided by a UF of 10 to estimate a chronic NOAEL, resulting in a TRV of 0.90 mg/kg-bw/day**. Used this value with a UF of 1000 for amphibians.**

AROCLOR 1260

Small Mammals: TRV = 7.4 mg/kg-bw/day

This value was based on a two generation study reporting a NOAEL of 7.4 mg/kg-bw/day for rats (Linder et al. 1974). The NOAEL was based on several reproductve endpoints, including number of litters, litter size, total pups per treatment group, pup survival, and mean body weight at weaning. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals: TRV = 0.15 mg/kg-bw/day

This value was based on a 4 mo NOAEL of 0.15 mg/kg-bw/day for mink exposed to Aroclor 1254 (Aulerich et al. 1977). The endpoints were survival, reproductive success and fetal mortality. This value was retained, as Aroclor 1254 and Aroclor 1260 have similar log Low values (6.5 and 6.8, respectively; ATSDR 1991), thus the bioaccumulation potential for Aroclor 1260 is expected to be similar to Aroclor 1254. The small and medium mammal data also suggest that Aroclors 1254 and 1260 affect these receptors at similar doses (ATSDR 1991). Further, mink are more sensitive to PCBs than most species of animals such as ferrets, mice, rats (Aulerich et al. 1985). Thus, mink are expected to be protective of these and other mammalian species. **Used this value for the Muskrat. Used this value for the Raccoon with a UF of 10 for inter-taxon variability. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

Chickens/Pheasants and Turkeys: TRV = 4.7 mg/kg-bw/day

This value was based on an 18 mo NOAEL of 100 mg/kg feed for domestic chickens (Keplinger et al. 1971). No effects on body weight, egg shell thickness, or egg hatchability were observed at the NOAEL dose. The value reported of 100 mg/kg feed was multiplied by the average amount of dry feed consumed daily by an adult chickens (0.085 kg; Welty, 1982) and divided by the weight of an adult domestic chicken (1.8 kg; Welty, 1982) to yield a TRV of 4.7 mg/kg-bw/day. **Used this value for the American Robin, Belted Kingfisher, and Marsh Wren with a UF of 10 based on inter-taxon variability.**

Ducks: TRV = 19.75 mg/kg-bw/day

This value was based on a 5 d LC50 value of 1,975 mg/kg reported for mallards exposed to Aroclor 1260 (Heath et al. 1972). This value was divided by 100 to estimate a chronic NOAEL, resulting in a TRV of 19.75 mg/kg-bw/day. **Used this value for the Mallard. Used this value**

for the Brown Pelican, Wood Stork, Reddish Egret, Green Heron, White-faced Ibis, and Spotted Sandpiper with a UF of 10 based on inter-taxon variability.

Raptors: TRV = 0.94 mg/kg-bw/day

No data were found regarding raptor exposure to Aroclor 1260. This value was based on the TRV for chickens/pheasants and turkeys of 4.7 mg/kg-bw/day because it was the most rigorous avian exposure to zinc found. This value was divided by 5 to account for inter-taxon variation, resulting in a TRV of 0.94 mg/kg-bw/day for raptors.

BENZENE

Small Mammals: TRV = 50 mg/kg-bw/day

This value was based on a 103 wk NOAEL value of 50 mg/kg-bw/day for both rats and mice exposed to benzene via gavage in corn oil (Huff et al. 1989). The NOAEL was based on survival and growth. Also found were 52 and 104 wk LOAELs for Sprague-Dawley rats (50 mg/kg-bw/day, a 104 wk LOAEL for Wistar rats (500 mg/kg-bw/day), and a 78 wk LOAEL for Swiss mice (500 mg/kg-bw/day) based on increased incidence of various carcinogenic tumors (Maltoni et al. 1989). **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium and Large Mammals: TRV = 10 mg/kg-bw/day

No data were found regarding the exposure of medium and large mammals to benzene. This value was based on the small mammal TRV of 50 mg/kg-bw/day and was divided by 5 to account for interspecies variability. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability. Used this value for the American Robin, Belted Kingfisher, Brown Pelican, Wood Stork, Reddish Egret, Green Heron, White-faced Ibis, Mallard, Spotted Sandpiper, and Marsh Wren with a UF of 100 based on aves/mammalian variability.**

Birds: TRV = No Data

No data were found regarding the exposure of birds to benzene.

CARBAZOLE

Small Mammals: TRV = 5.0 mg/kg-bw/day

This value was based on an acute oral LD_{LO} of 500 mg/kg-bw for rats exposed to carbazole (Sax 1984). The LD_{LO} dose was the lowest dose tested producing a lethal effect. The LD_{LO} was divided by 100 to estimate a chronic NOAEL, resulting in a TRV of 5.0 mg/kg-bw/day. No other data were found. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability. Used this value for the Belted Kingfisher with a UF of 100 based on aves/mammalian variability.**

Medium and Large Mammals: TRV = 1.0 mg/kg-bw/day

No data were found regarding medium or large mammal exposure to carbazole. This TRV was based on the small mammal TRV of 5.0 mg/kg-bw/day and divided by 5 to account for interspecies extrapolation. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability. Used this value for the American Robin, Marsh Wren, Brown Pelican, Wood Stork, Reddish Egret, White-faced Ibis, Green Heron, Spotted Sandpiper, and Mallard with a UF of 100 based on aves/mammalian variability.**

All Birds (ND)

No data were found regarding carbazole exposure to birds.

CIS 1,2 DICHLOROETHENE

Small Mammals: TRV = 206 mg/kg-bw/day

This TRV is based on a 90 d NOAEL of 206 mg/kg-bw/day for rats exposed to cis-DCE via oral gavage in corn oil (McCauley et al. 1995). Survival, food and water consumption, and body weights were not affected at the NOAEL dose. Most of the clinical chemistry and hematology effects measured were marginal and not biologically meaningful or dose related (McCauley et al. 1995). **Used for Short Tailed Shrew. Used for Bullfrog with a UF of 100.**

cis-1,2-dichloroethene (cis-DCE) - Medium and Large Mammals: TRV = 41.2 mg/kg-bw/day

No data were found regarding exposure of medium or large mammals to cis-1,2-dichloroethene. This value was based on the small mammal TRV of 206 mg/kg-bw/day and was divided by 5 to account for interspecies variability. **Used for the Muskrat and Raccoon. Used for the Painted turtle, American Robin, Marsh Wren, Belted Kingfisher, Mallard, Green Heron, Reddish Egret, Brown Pelican, Wood Stork, Spotted Sandpiper and White Faced Ibis with a UF of 100.**

cis-1,2-dichloroethene (cis-DCE) - All Birds: TRV = (ND)

No data were found regarding exposure of birds to cis-1,2-dichloroethene.

TRANS-1,2 DICHLOROETHENE

Small Mammals: TRV = 2809 mg/kg-bw/day

This TRV is based on a 90 d NOAEL of 2809 mg/kg-bw/day (males = 3114 mg/kg-bw/day) for mice exposed to trans-1,2 DCE in drinking water (Hayes et al. 1987). The NOAEL was based on water consumption, body weight, general behavior, hematology, urinalysis, and serum chemistries. **Used for Short Tailed Shrew. Used for Bullfrog with a UF of 100.**

trans-1,2-dichloroethene - Medium and Large Mammals: TRV = 562 mg/kg-bw/day

No data were found regarding exposure of medium or large mammals to trans-1,2 DCE. This value was based on the small mammal TRV of 2809 mg/kg-bw/day and was divided by 5 to account for interspecies variability. **Used for the Muskrat and Raccoon. Used for the Painted turtle, American Robin, Marsh Wren, Belted Kingfisher, Mallard, Green Heron, Reddish Egret, Brown Pelican, Wood Stork, Spotted Sandpiper and White Faced Ibis with a UF of 100.**

trans-1,2-dichloroethene - All Birds: TRV = (ND)

No data were found regarding exposure of birds to trans-1,2-DCE.

CARBON DISULFIDE

Small Mammals: TRV = 5.0 mg/kg-bw/day

This value was based on a 10 day LOAEL of 25 mg/kg-bw/day for New Zealand white rabbits dosed via oral gavage during gestational days 9-19 (ATSDR, 1996). A significant increase in resorptions compared to controls was observed at this dose. The 25 mg/kg-bw/day value was divided by 5 to estimate a NOAEL, resulting in a TRV of 5.0 mg/kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability. Used this value for the Belted Kingfisher with a UF of 10 based on aves/mammalian variability.**

Medium Mammals: TRV = 1.0 mg/kg-bw/day

No data were found regarding medium mammal exposure to carbon disulfide. The medium mammal TRV was based on the small mammal TRV of 5.0 mg/kg-bw/day and divided by 5 to account for interspecies extrapolation. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability. Used this value for the American Robin, Marsh Wren, Brown Pelican, Wood Stork, Reddish Egret, White-faced Ibis, Green Heron, Spotted Sandpiper, and Mallard with a UF of 100 based on aves/mammalian variability.**

All Birds (ND)

No data were found regarding bird exposure to carbon disulfide.

CARBON TETRACHLORIDE

Small Mammals: TRV = 15.0 mg/kg-bw/day

This value was based on a 2 yr NOAEL of 15 mg/kg-bw/day for rats fed carbon tetrachloride in feed (Alumot et al. 1976). The NOAEL was the highest dose tested, and was based on several reproductive endpoints, including percent females pregnant, percent females with litters, litter size, and mortality and body weight of offspring. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability. Used this value for the Belted Kingfisher with a UF of 10 based on aves/mammalian variability.**

Medium and Large Mammals: TRV = 3.0 mg/kg-bw/day

No data were found regarding medium mammal exposure to carbon tetrachloride. The medium and large mammal TRV was based on the small mammal TRV of 15.0 mg/kg-bw/day and divided by 5 to account for interspecies extrapolation. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability. Used this value for the American Robin, Marsh Wren, Brown Pelican, White-faced Ibis, Wood Stork, Reddish Egret, Green Heron, Spotted Sandpiper, and Mallard with a UF of 100 based on aves/mammalian variability.**

CHLOROBENZENE

Chlorobenzene - Small Mammals: TRV = 60 mg/kg-bw/day

This value was based on a 103 wk and 91 d NOAELs of 60 mg/kg-bw/day for rats and mice, respectively (ATSDR, 1989). Clinical signs of toxicity were not observed in mice or rats but centrilobular degeneration and necrosis of the liver, kidney, and spleen was evident. Liver and kidney weights increased in both mice and rats, while spleen weights decreased. A 103 wk NOAEL of 120 mg/kg-bw/day was also reported for mice (ATSDR, 1989). **Used this value for the Short-tailed Shrew. Used this value for the American Robin, Marsh Wren, Brown Pelican, White-faced Ibis, Wood Stork, Reddish Egret, Green Heron, Spotted Sandpiper, Bullfrog, Belted Kingfisher, Painted Turtle and Mallard with a UF of 100 based on aves/mammalian, amphibian/mammalian and reptile/mammalian variability.**

Chlorobenzene - Medium Mammals, Raccoon, Coyote, and Deer: TRV =12 mg/kg-bw/day

No data were found regarding medium and large mammal exposure to chlorobenzene. The small mammal TRV of 60 mg/kg-bw/day was divided by 5 to account for interspecies extrapolation. **Used this value for the Raccoon and Muskrat.**

Chlorobenzene - All Birds (ND)

No data were found regarding bird exposure to chlorobenzene.

CHLOROFORM

Small Mammals: TRV = 41 mg/kg-bw/day

This value was based on a NOAEL of 41 mg/kg-bw/day for mice exposed to chloroform administered via gavage in corn oil (NTP 1988). At the NOAEL dose, no effects on fertility, reproduction, survival, body weights, and epididymal sperm parameters in males (i.e., sperm motility, sperm count, and sperm morphology) were observed. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability. Used this value for the Belted Kingfisher with a UF of 100 based on aves/mammalian variability.**

Medium Mammals: TRV = 8.2 mg/kg-bw/day

Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability. Used this value for the American Robin, Marsh Wren, Brown Pelican, White-faced Ibis, Wood Stork, Reddish Egret, Green Heron, Spotted Sandpiper, and Mallard with a UF of 100 based on aves/mammalian variability.

All Birds: TRV = (ND)

No data were found regarding birds.

DIBENZOFURAN

Small Mammals: TRV = 1.2 mg/kg-bw/day

No data were found regarding small mammal exposure to dibenzofuran. This value was based on a 103 wk LOAEL of 30 mg/kg-bw/day for rats and mice exposed to 2,3-benzofuran (ATSDR, 1990). 2,3-Benzofuran was used as a surrogate compound for dibenzofuran because of similarities between these compounds with respect to physical and chemical characteristics. Male rat survival was significantly reduced at 30 mg/kg-bw/day due to spontaneous nephropathy, characterized by degeneration, necrosis, and mineralization of tubular cells. Bone degeneration and other effects exacerbated the effects of nephropathy. Female rats were less sensitive than males to 2,3-benzofuran, with a NOAEL of 60 mg/kg-bw/day due to the above-related effects. Mice exposed separately to 2,3-benzofuran showed similar sensitivities as compared to female rats. A 103 wk cancer effect level (CEL) of 60 mg/kg-bw/day was observed for male rats and male and female mice. The LOAEL of 30 mg/kg-bw/day was divided by 5 to estimate a chronic NOAEL and further divided by 5 to extrapolate across compounds, yielding 1.2 mg/kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals: TRV = 0.24 mg/kg-bw/day

No data were found regarding medium mammal exposure to dibenzofuran. This value was based on the small mammal TRV of 1.2 mg/kg-bw/day and was divided by 5 to account for interspecies variability. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

All Birds: TRV = 1.02 mg/kg-bw/day

This value was based on a single oral dose for red-winged blackbird of >102 mg/kg-bw exposed to dibenzofuran (Schafer et al. 1983). The LC_{50} value for the blackbird exceeded the highest dose tested (102 mg/kg-bw). The value of 102 mg/kg-bw was divided by a UF of 100 to estimate a chronic NOAEL, resulting in a TRV of 1.02 mg/kg-bw/day. **Used this value for the American Robin, Belted Kingfisher, Marsh Wren, Brown Pelican, Wood Stork, Reddish Egret, Spotted Sandpiper, Green Heron White-faced Ibis, and Mallard.**

ETHYL BENZENE

Small Mammals: TRV = 9.5 mg/kg-bw/day

This value was based on a single oral dose LD50 of 4,769 mg/kg for rats dosed via oral gavage (ATSDR, 1999). This value was divided by 500 to estimate a chronic NOAEL, yielding a TRV of 9.5 mg/kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium and Large Mammals: TRV = 1.9 mg/kg-bw/day

No data were found regarding medium and large mammal exposure to ethyl benzene. The small mammal TRV of 9.5 mg/kg-bw/day was divided by 5 to account for interspecies extrapolation. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

All Birds: TRV = 0.1 mg/kg-bw/day

No data were found for birds exposed to ethyl benzene. This value was based on the 90 d NOAEL of 0.53 mg/kg-bw/day for Japanese quail exposed to hexachlorobenzene (Vos et al. 1971). The HCB TRVs was divided by 5 to account for extrapolation across compounds. **Used this value for the American Robin, Belted Kingfisher, Marsh Wren, Brown Pelican, Spotted Sandpiper, Green Heron, Wood Stork, Reddish Egret, White-faced Ibis, and Mallard.**

HEXACHLOROBENZENE (HCB)

Small Mammals: TRV = 2.80 mg/kg-bw/day

This value was based on a 2 yr (4 generations) NOAEL of 2.80 mg/kg-bw/day for rats exposed to HCB (Grant et al. 1977). The endpoints measured included lactation, fertility, and offspring viability indices and offspring birth weights. The NOAEL of 40 mg/kg dietary feed was multiplied by the estimated daily consumption of rats (0.014 kg; Nagy, 1987) and then divided by the average mass of an adult Norway rat (200 g; Burt and Grossenheider, 1976) to yield a NOAEL of 2.80 mg/kg-bw/day. This NOAEL is supported and supplemented by other data found for mice and hamsters. Cabral et al. (1979) reported a NOAEL of 6 mg/kg-bw/day for mice exposed to HCB for 105-120 wks based on induction of liver-cell tumors. Cabral et al. (1977) also reported a LOAEL of 4 mg HCB/kg-bw/day (50 mg/kg) for life cycle exposures (70 wks) of hamsters based on hepatoma formation and tumor incidence in liver. Also found was a 2 gen NOAEL of 2.96 mg/kg-bw/day for rats exposed to HCB based on survival, growth, feed consumption, fertility, and gestation and lactation indicies (Arnold et al. 1985). **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals: TRV = 0.12 mg/kg-bw/day

This value was based on a 331 d NOAEL of 0.12 mg/kg-bw/day for mink to HCB (Bleavins et al. 1984). The endpoints included kit mortality and growth, litter size, and increased percentage of stillbirths. The average mass of HBC consumed for 331 d of 58.5 mg was divided by the number of days (331) and then divided by the average mass of adult minks (1.5 kg-bw; Hornshaw et al. 1986) to yield 0.12 mg/kg-bw/day. Bleavins et al. (1984) also reported a 332 d NOAEL value for ferrets of 0.88 mg/kg-bw/day. Gralla et al. (1977) exposed beagle dogs to HCB for 1 yr, resulting in a NOAEL of 1.2 mg/kg-bw/day. The endpoints measured were mortality, body weight, and various gastrointestinal and hepatic effects (Gralla et al. 1977). Since the key study by Bleavins et al. (1984) for mink provided a chronic NOAEL and is supported by other data, no uncertainty factors were applied. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

Chicken/Pheasant and Turkey: TRV = 0.53 mg/kg-bw/day

This value was based on a 90 d NOAEL of 0.53 mg/kg-bw/day for Japanese quail exposed to HCB (Vos et al. 1971). The NOAEL reported as 5 mg/kg dietary feed was multiplied by the estimated daily consumption of Japanese quail (0.016 kg/d; Nagy, 1987) and then divided by the average body weight of quail used (150 g) to yield a NOAEL of 0.53 mg/kg-bw/day. At the NOAEL dose, egg hatchability, survival, egg production, and eggshell thickness were not affected, whereas significant increases of liver weights, fecal coprophorphyrin excretion and liver lesions were observed.

Other Birds: TRV = 0.11 mg/kg-bw/day

No data were found regarding other bird exposure to hexachlorobenzene. This value was based on the TRV for chicken/pheasant and turkey of 0.53 mg/kg-bw/day. This value was divided by 5 to account for inter-taxon variation, resulting in a TRV of 0.11 mg/kg-bw/day.
Used this value for the American Robin, Belted Kingfisher, Marsh Wren, Wood Stork, Reddish Egret, Brown Pelican, Spotted Sandpiper, Green Heron White-faced Ibis, and Mallard.

HEXACHLOROBUTADIENE (HCBD)

Small Mammals: TRV = 0.2 mg/kg-bw/day

This value was based on a 2 yr and 5 mo NOAELs of 0.2 mg/kg-bw/day for rats (Schwetz et al. 1977). At the NOAEL dose, no effects on carcinogenicity, adult female preganancy rates and neonate survival, development, and body weights were observed. No other data were found regarding mammal exposure to HCBD. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals: TRV = 0.04 mg/kg-bw/day

No data were found regarding medium mammal exposure to hexachlorobutadiene. The small mammal TRV of 0.2 mg/kg-bw/day was used to extrapolate to the medium mammal TRV by dividing by 5 to account for inter-taxon variability. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

All Birds: TRV = 1.2 mg/kg-bw/day

This value was based on a 90 d NOAEL of 6 mg/kg-bw/day for Japanese quail (Schwetz et al. 1974). At the NOAEL dose, no effects on body weight, food consumption, egg production, fertility and hatchibility of eggs, survival of hatched chicks, or eggshell thickness were observed. No other data were found regarding bird exposure to HCBD. The NOAEL for Japanese quail was divided by 5 to extrapolate to other species of birds, yielding a TRV of 1.2 mg/kg-bw/day. **Used this value for the American Robin, Belted Kingfisher, Marsh Wren, Wood Stork, Reddish Egret, Brown Pelican, Spotted Sandpiper, Green Heron White-faced Ibis, and Mallard.**

METHYL ETHYL KETONE (2-BUTANONE)

Small Mammals: TRV = 173 mg/kg-bw/day

This value was based on a 13 wk NOAEL of 173 mg/kg-bw/day for rats (Ralston et al. 1985). The NOAEL was based on several neurological endpoints, including hindlimb grasp, hindlimb place, balance beam, and roto-rod. No other chronic or subchronic data were found. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability. Used this value for the Belted Kingfisher with a UF of 100 based on aves/mammalian variability.**

Medium and Large Mammals: TRV = 34.6 mg/kg-bw/day

No data were found for medium or large mammals. This value was based on the small mammal TRV of 173 mg/kg-bw/day and divided by 5 to account for intertaxon variability, resulting in a TRV of 34.6 mg/kg-bw/day. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability. Used this value for the American Robin, Marsh Wren, Wood Stork, Reddish Egret, Brown Pelican, Green Heron, Spotted Sandpiper, White-faced Ibis, and Mallard with a UF of 100 based on aves/mammalian variability.**

All Birds (ND)

No data were found for birds.

METHYL TERT BUTYL ETHER (MTBE)

Small Mammals: TRV = 900 mg/kg-bw/day

This value was based on a 90 d NOAEL of 900 mg/kg-bw/day for rats exposed via gavage to MTBE in corn oil (Robinson et al. 1990). Survival, body weight, food and water consumption, and organ weights were not affected at the NOAEL. Systemic or target organ toxicity was not observed. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability. Used this value for the Belted Kingfisher with a UF of 10 based on aves/mammalian variability.**

Medium Mammals: TRV = 180 mg/kg-bw/day

No data were found regarding medium mammals. The small mammal TRV was divided by 5 to extrapolate across taxa to account for interspecies extrapolation, resulting in a TRV of 180 mg/kg-bw/day. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability. Used this value for the American Robin, Marsh Wren, Brown Pelican, Wood Stork, Reddish Egret, Green Heron, Spotted Sandpiper, White-faced Ibis, and Mallard with a UF of 100 based on aves/mammalian variability.**

Birds: TRV = (ND)

No data were found regarding avian receptor exposure to MTBE.

N-NITROSODIPHENYLAMINE

Small Mammals: TRV = 50 mg/kg-bw/day

This value was based on a 100 wk NOAEL of 50 mg/kg-bw/day for rats (ATSDR, 1991). No reduction in survival was observed at this concentration. This was the lowest NOAEL value found for chronic exposures for both rats and mice, which ranged from 150 to 2600 mg/kg-bw/day; ATSDR, 1991). **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability. Used this value for the Belted Kingfisher with a UF of 10 based on aves/mammalian variability.**

Medium Mammals, Raccoon, Coyote, Deer: TRV =10 mg/kg-bw/day

No data were found for medium or large mammals. The small mammal TRV was divided by 5 for interspecies extrapolation to yield a TRV of 10 mg/kg-bw/day. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability. Used this value for the American Robin, Wood Stork, Reddish Egret, Marsh Wren, Brown Pelican, Green Heron, Spotted Sandpiper, White-faced Ibis, and Mallard with a UF of 100 based on aves/mammalian variability.**

All Birds (ND)

No data were found regarding the exposure of birds to N-Nitrosodiphenylamine.

PENTACHLOROPHENOL (PCP)

Small Mammals: TRV = 3.0 mg/kg-bw/day

This value was based on a 62 day NOAEL of 3 mg/kg-bw/day for rats (ATSDR 1994). The NOAEL was based on litter size, neonatal survival, and neonatal body weight. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium Mammals: TRV = 0.6 mg/kg-bw/day

No data were found for medium or large mammals. This value was based on the small mammal value and was divided by 5 to account for interspecies extrapolation, resulting in a TRV of 0.6 mg/kg-bw/day.

Large Mammals: TRV = 1.0 mg/kg-bw/day

This value was based on a 5 wk NOAEL of 1.0 mg/kg-bw/day for newborn calves exposed to analytical grade PCP in milk (Shull et al. 1986). The NOAEL was based on growth impairment in liver and lungs, pathological changes in thymus and eyes, and renal function. The LOAEL from the same study and endpoints was 10 mg/kg-bw/day. Results using analytical grade PCP were used because technical grade PCP contains impurities such as chlorinated dioxins and furans which were considered responsible for mammalian toxicity in previous PCP studies (McConnell et al. 1980). Newborn calves are apparently more sensitive to the toxic effects of PCP, as a 160 d NOAEL of 16.1 mg/kg-bw/day for yearling Holstein cattle exposed to analytical grade PCP has been reported based on growth and feeding efficiency (McConnell et al. 1980). **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

Ducks: TRV = 3.8 mg/kg-bw/day

This value was based on a single oral dose LD50 of 380 mg/kg-bw for mallards (Hudson 1984). This value was divided by 100 to estimate a chronic NOAEL, resulting in a TRV of 3.8 mg/kg-bw/day. **Used this value for the Mallard.**

Ground-Feeding Birds: TRV = 27.4 mg/kg-bw/day

This value was based on an 8 wk NOAEL of 27.4 mg/kg-bw/day for domestic chickens (Prescott et al. 1982). The NOAEL was based on growth, liver weights, and humoral and cell-mediated immune responses. The value reported as 600 mg/kg feed was multiplied by the amount of feed consumed daily by the chickens (0.091 kg/d) and divided by the weight of exposed hens (2.0 kg) to yield a TRV of 27.4 mg/kg-bw/day. The LOAEL for the same study and endpoints was 56.4 mg/kg-bw/day.

Other Birds: TRV = 5.5 mg/kg-bw/day

No data were found regarding raptors, songbirds, or waterbirds. The TRV for chickens was used because it was the most rigorous exposure found for birds exposed to PCP. The chicken TRVs were divided by 5 to extrapolate across taxa to account for interspecies extrapolation, resulting in a TRV of 5.5 mg/kg-bw/day. **Used this value for the Green Heron, Wood Stork, Reddish Egret, American Robin, Marsh Wren, Belted Kingfisher, Spotted Sandpiper, White-faced Ibis, and Brown Pelican.**

PHENOL

Small Mammals: TRV = 60 mg/kg-bw/day

This value was based on a NOAEL of 60 mg/kg-bw/day for rats administered phenol in drinking water via gavage on days 6-15 of gestation (Jones-Price et al. 1983). The NOAEL was based on average fetal body weight per litter. Teratogenic effects and maternal toxicity were not observed at the LOAEL dose of 120 mg/kg-bw/day. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability.**

Medium and Large Mammals: TRV = 12 mg/kg-bw/day

No data were found regarding medium or large mammal exposure to phenol. This value was based on the small mammal value and divided by 5, resulting in a TRV of 12 mg/kg-bw/day. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability.**

Passerine Birds: TRV = 1.13 mg/kg-bw/day

This value was based on a single oral dose for red-winged blackbird of >113 mg/kg-bw (Schafer et al. 1983). The LC_{50} value for blackbird exceeded the highest dose tested (113 mg/kg-bw). The value of 113 mg/kg-bw for red-winged blackbird was divided by a UF of 100 to estimate a chronic NOAEL, resulting in a TRV of 1.13 mg/kg-bw/day. **Used this value for the Marsh Wren, American Robin and Belted Kingfisher.**

Other Birds: TRV = 0.23 mg/kg-bw/day

No data were found regarding other birds. This value was based on the passerine value and divided by 5, resulting in a TRV of 0.23 mg/kg-bw/day. **Used this value for the Green Heron, White-faced Ibis, Wood Stork, Reddish Egret, Brown Pelican, Mallard, and Spotted Sandpiper.**

ALL OTHER PHENOLS

Includes: 2,4,5 Trichlorophenol, 2,4, 6 Trichlorophenol, 2 Chrlorophenol, Biphenyl and 4 Methylphenol and 2,4 Dichlorophenol.

All Other Phenols - Small Mammals: TRV = 0.6 mg kg-bw/day; Used for the Short-Tailed Shrew. Used for the Bullfrog and Painted Turtle with a UF of 100 for intertaxonomic variability.

All Other Phenols - Medium Mammals: TRV = 0.12 mg kg-bw/day; Used for the Raccoon and Muskrat.

All Other Phenols - Ground-feeding Birds: TRV = 5.5 mg kg-bw/day
All Other Phenols - Other Birds: TRV = 1.1 mg kg-bw/day; Used for the Marsh Wren, American Robin, Belted Kingfisher, Mallard, Green Heron, Wood Stork, Reddish Egret, Brown Pelican, White Faced Ibis and the Spotted Sandpiper.

No data were found regarding other phenolic compounds. These TRVs were based on the pentachlorophenol TRVs and divided by 5 to account for extrapolations across compounds.

XYLENE

Small Mammals: TRV = 500 mg/kg-bw/day

This value was based on a 103 wk NOAEL of 500 mg/kg-bw/day for rats exposed to mixed xylenes (ATSDR 1995). The NOAEL was based on reproductive success (no histopathological changes in reproductive organs). This was also the lowest NOAEL reported in ATSDR (1995), regardless of the endpoints measured. **Used this value for the Short-tailed Shrew. Used this value for the Bullfrog with a UF of 100 based on amphibian/mammalian variability. Used this value for the Belted Kingfisher with a UF of 10 based on aves/mammalian variability.**

Medium and Large Mammals: TRV = 100 mg/kg-bw/day

No data were found regarding medium and large mammals. This value was based on the small mammal value of 500 mg/kg-bw/day and divided by 5 to account for intertaxon variability, resulting in a TRV of 100 mg/kg-bw/day. **Used this value for the Raccoon and Muskrat. Used this value for the Painted Turtle, with a UF of 100 based on reptilian/mammalian variability. Used this value for the American Robin, Green Heron, Wood Stork, Reddish Egret, Marsh Wren, White-faced Ibis, Brown Pelican, Mallard, and Spotted Sandpiper with a UF of 100 based on aves/mammalian variability.**

All Birds: TRV = No Data

No data were found for birds.

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UNCERTAINTY FACTORS, RATIONALE AND SOURCES, USED TO CALCULATE TOXICITY REFERENCE VALUES
STAR LAKE CANAL SUPERFUND SITE
JEFFERSON COUNTY, TEXAS

AMERICAN ROBIN

	CONSTITUENTS	TRV	UF	RATIONALE	SOURCE
Metals	Aluminum	1.11E+00	100	LC50 of 111 mg/Kg-bw/day for red-wing blackbird	Schafer, et. al., 1983
	Antimony	3.50E-03	100	Small Mammal Life Cycle NOAEL of 0.35 mg/Kg-bw/day	Schroeder, et. al. 1968
	Arsenic	7.33E+00	1	6-month NOAEL of 7.33 mg/Kg-bw/day for cowbird	Eisler, 2000
	Barium	1.39E+01	3, 5	4-week NOAEL of 208 mg/Kg-bw/day for chicken / 3 for chronic NOAEL / 5 for species	Sample, et. al,1996
	Beryllium	5.16E-02	5, 100	2-year NOAEL of 25.8 mg/Kg-bw/day for rat divided by 5 for large mammal and by 100 for birds	Morgareidge, et. al., 1977
	Cadmium	4.20E-02	5	Chicken TRV of 0.21 mg/Kg-bw/day / 5 for species	Leach, et. al., 1979
	Chromium VI	2.10E-01	5, 5	5.25 mg/Kg-bw/day LOAEL for chicken / 5 to estimate TRV / 5 for species	Asmatullah, et. al., 1999
	Cobalt	1.10E+00	3, 5	4-week NOAEL of 16.7 mg/Kg-bw/day for duck / 3 for duck TRV / 5 for species	Van Vleet 1982
	Copper	5.00E-01	100	LD50 of 50mg/Kg-bw/day for red-wing blackbird / 100 for chronic NOAEL	Schafer, et. al., 1983
	Lead	9.30E-01	3	11-day NOAEL of 2.8 mg/Kg-bw/day for starling / 3 for TRV	Osborn, et. al., 1983
	Manganese	7.30E+00	1	7.3 mg/Kg-bw/day required dose for successful reproduction	Offiong and Abed, 1980
	Mercury	2.90E-01	3	76-day NOAEL of 0.88 mg/Kg-bw/day for finches / 3 for TRV	Scheuhammer 1988
	Nickel	2.59E+01	5	90-day NOAEL of 129.5 mg/Kg-bw/day for mallards / 5 for species	Eastin and O'Shea, 1981
	Selenium	2.00E-01	5	11 - 12 week NOAEL of 1 mg/Kg-bw/day for ducks / 5 for species	Heinz, et. al., 1987
	Silver	5.50E-01	5	4-week NOAEL of 8.3 mg/Kg-bw/day for ducks / 5 for species	Van Vleet 1982
	Vanadium	1.30E-01	5	3-week NOAEL of 0.67 mg/Kg-bw /day for chickens / 5 for species	Romoser, et. al., 1961
	Zinc	2.50E+01	5	12 and 44-week NOAEL of 125 mg/Kg-bw/day for chickens / 5 for species	Stahl, et. al., 1990
	Cyanide (total)	9.00E-02	100	LC50 of 9 mg/Kg-bw/day for starlings / 100 for NOAEL	Wiemeyer, et. al., 1986
VOCs	Benzene	1.00E-01	5, 100	103-week NOAEL of 50 mg/Kg-bw/day for rodents / 5 for large mammals / 100 for birds	Huff, et. al., 1989
	Carbon disulfide	1.00E-02	5, 5, 100	10-day NOAEL of 25 mg/Kg-bw/day for rabbits / 5 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR, 1996
	Carbon tetrachloride	3.00E-02	5, 100	2-year NOAEL of 15 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	Alumot, et. al., 1976
	Ethylbenzene	1.00E-01	5	90-day NOAEL of 0.53 mg/Kg-bw/day for quail for hexachlorobenzene / 5 for extrapolation across compounds	Vos, et. al., 1971
	Methyl Tert Butyl Ether	1.80E-01	5, 100	90-day NOAEL of 900 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	Robinson, et. al., 1990
	trans-1,2-Dichloroethene	5.62E+00	5, 100	90-day NOAEL of 2809 mg/Kg-bw/day for mice / 5 large mammals / 100 for birds	Hayes, et. al., 1987
	Xylene	1.00E+00	5, 100	103-week NOAEL of 500 mg/Kg-bw/day for rodents / 5 for large mammals / 100 for birds	ATDSR, 1995
SVOCs	2,4,6-Trichlorophenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	2,4-Dichlorophenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	4-Methylphenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	Biphenyl	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	bis(2-chloroethyl)ether	5.00E-02	5, 100	78-week NOAEL of 25 mg/Kg-bw/day for rats / 5 for medium mammals / 100 for birds	Weisburger, et. al., 1981
	bis(2-ethylhexyl)phthalate	1.02E+01	15, 5	4-week LOAEL of 763 mg/Kg-bw/day for chicken / 15 for chronic NOAEL / 5 for species	Wood and Bitman, 1984
	Carbazole	1.00E-02	100, 5, 100	LDLo of 500 mg/Kg-bw for rats / 100 for chronic NOAEL / 5 for large mammals / 100 for birds	Sax, 1984
	Dibenzofuran	1.02E+00	100	LC50 of >102 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
	Di-n-butylphthalate	4.45E+00	3, 15	30-day NOAEL of 66.7 mg/Kg-bw/day for starlings / 3 for chronic NOAEL / 5 for species	O'Shea and Stafford, 1980
	Hexachlorobenzene	1.10E-01	5	90-day NOAEL of 0.53 mg/Kg-bw/day for quail for hexachlorobenzene / 5 for extrapolation across compounds	Vos, et. al., 1971
	Hexachlorobutadiene	1.20E+00	5	90-day NOAEL of 6 mg/Kg-bw/day for quail / 5 for species	Schwetz, et. al., 1974
	N-Nitrosodiphenylamine	1.00E-01	5, 100	100-week NOAEL of 50 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	ATSDR, 1991
	Pentachlorophenol	5.50E+00	5	8-week NOAEL of 27.4 mg/Kg-bw/day for chickens / 5 for species	Prescott, et. al., 1982
PAHs	2-Methylnaphthalene	1.20E+00	5	Naphthalene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Acenaphthene	1.01E+00	100	LC50 of >101 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
	Acenaphthylene	2.02E-01	5	Acenaphthene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Anthracene	1.11E+00	100	LC50 of >111 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
	Benzo(a)anthracene	2.00E-04	15, 5, 100	5-week LOAEL of 1.5 mg/Kg-bw/day for mice / 15 for chronic NOAEL / 5 for large mammal / 100 for birds	ATSDR 1993
	Benzo(a)pyrene	1.30E-03	15, 5, 100	9-day LOAEL of 10 mg/Kg-bw/day for mice / 15 for NOAEL / 5 for large mammals / 100 for birds	Mackenzie & Angevine, 1981
	Benzo(b)fluoranthene	8.00E-03	10, 5, 100	chronic carcinogenicity of 40 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 large mammals / 100 for birds	Sims & Overcash, 1983
	Benzo(g,h,i)perylene	3.00E-03	5	Benzo(a)pyrene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Benzo(k)fluoranthene	1.44E-02	10, 5, 100	chronic carcinogenicity of 72 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 large mammals / 100 for birds	Sims & Overcash, 1983
	Chrysene	1.98E-02	10, 5, 100	carcinogenicity of 99 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 for large mammals / 100 for birds	Sims & Overcash, 1983
	Dibenz(a,h)anthracene	3.40E-02	3, 5, 100	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Fluoranthene	2.00E-01	5, 5, 100	13-week NOAEL of 500 mg/kg-bw/day for mice / 5 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Fluorene	1.01E+00	100	LC50 of >101 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
	Naphthalene	6.20E+00	5	TRV of 30.8 mg/Kg-bw/day for mallards / 5 for species	Patton and Dieter, 1980
	Phenanthrene	1.13E+00	100	LC50 of >113 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
	Pyrene	3.43E-01	3, 5, 100	10-day NOAEL of 514 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Total PAHs	7.10E-01	1	22-week NOAEL of 0.71 mg/Kg-bw/day for ducks	Stubblefield, et. al., 1995
PCBs	Aroclor-1016	3.00E-02	100	247-day NOAEL of 3 mg/Kg-bw/day for mink / 100 for birds	Ringer, et. al., 1981
	Aroclor-1242	2.40E-02	10	6-week NOAEL of 0.24 mg/Kg-bw/day for chickens / 10 for species	Britton and Huston, 1973
	Aroclor-1248	9.00E-02	5	1.5-year NOAEL of 0.45 mg/Kg-bw/day / 5 for species	McLane and Hughes, 1980
	Aroclor-1254	2.40E-03	2000	56-day NOAEL of 24 mg/Kg-bw/day for finches	Presst, et. al., 1970
	Aroclor-1260	4.70E-01	10	18-month NOAEL yielding TRV of 4.7 mg/Kg-bw/day for chickens / 10 for species	Keplinger, et. al., 1971
	Total PCBs	1.34E-04	10, 100	182-day LOAEL of 0.134 mg/Kg-bw/day for mink / 10 for chronic NOAEL / 100 for birds	Heaton et. al., 1995
Pesticides	4,4'-DDE	2.70E-01	5	1.5-year NOAEL of 1.36 mg/Kg-bw/day for ducks / 5 for species	Heath, et. al., 1972
	4,4'-DDT	1.42E+00	10	48 - 115-day NOAEL of 14.2 mg/Kg-bw/day for finches / 10 for chronic NOAEL	Jeffries, 1967
	Aldrin	2.40E-01	100	LD50 of 23.7 mg/Kg-bw for starlings / 100 for chronic NOAEL	Schafer, et. al., 1983
	Alpha-chlordane	5.00E-02	100	14-day LD50 for starlings of 5.33 mg/Kg-bw/day / 100 for chronic NOAEL	Eisler, 1990
	beta-BHC	3.00E+00	10	30-day EMLD of 30 mg/Kg-bw/day for mallard / 10 for chronic NOAEL	Hudson, et. al., 1984
	Dieldrin	5.60E-02	5	2-year NOAEL of 0.28 mg/Kg-bw/day for pigeons / 5 for species	Ahmed, et. al., 1978
	Endosulfan I	1.30E-02	100, 5	LD50 of 6.47 mg/Kg for mallards / 100 to estimate NOAEL / 5 for species	Hudson, et. al., 1972
	Endosulfan II	1.30E-02	100, 5	LD50 of 6.47 mg/Kg for mallards / 100 to estimate NOAEL / 5 for species	Hudson, et. al., 1972
	Endrin	2.00E-02	5	10-week NOAEL of 0.1 mg/Kg-bw/day for pheasant / 5 for species	Genelly and Rudd 1956
	Endrin ketone	2.00E-02	5	Endrin value for ground feeding birds / 5	DeWitt 1956
	gamma-BHC	1.20E-01	100, 10	96-hour LD50 of 120 mg/Kg-bw for quail / 100 for chronic NOAEL / 10 for species	Dahlen and Haugen 1954
	Gamma-chlordane	5.00E-02	100	14-day LD50 for starlings of 5.33 mg/Kg-bw/day / 100 for chronic NOAEL	Eisler, 1990
	Heptachlor	1.81E+00	100	LD50 of 181 mg/kg for American woodcock / 100 to estimate NOAEL	Stickel, et. al., 1956
	Methoxychlor	3.75E+01	100	5-day NOAEL of 3750 mg/Kg-bw/day for robins / 100 for chronic NOAEL	Hunt & Sacho, 1969
	Toxaphene	4.16E-02	10, 10	74-day NOAEL of 4.16 mg/Kg-bw/day for pheasants / 10 for chronic NOAEL / 10 for species	Genelly and Rudd, 1956

UNCERTAINTY FACTORS, RATIONALE AND SOURCES, USED TO CALCULATE TOXICITY REFERENCE VALUES
STAR LAKE CANAL SUPERFUND SITE
JEFFERSON COUNTY, TEXAS

BELTED KINGFISHER

	CONSTITUENTS	TRV	UF	RATIONALE	SOURCE
Metals	Aluminum	1.11E+00	100	LC50 of 111 mg/Kg-bw/day for red-wing blackbird	Schafer, et. al., 1983
	Antimony	3.50E-03	100	Small Mammal Life Cycle NOAEL of 0.35 mg/Kg-bw/day	Schroeder, et. al. 1968
	Arsenic	7.33E+00	1	6-month NOAEL of 7.33 mg/Kg-bw/day for cowbird	Eisler, 2000
	Barium	1.39E+01	3, 5	4-week NOAEL of 208 mg/Kg-bw/day for chicken / 3 for chronic NOAEL / 5 for species	Sample, et. al,1996
	Beryllium	5.16E-02	5, 100	2-year NOAEL of 25.8 mg/Kg-bw/day for rat divided by 5 for large mammal and by 100 for birds	Morgareidge, et. al., 1977
	Cadmium	4.20E-02	5	Chicken TRV of 0.21 mg/Kg-bw/day	Leach, et. al., 1979
	Chromium VI	2.10E-01	5, 5	5.25 mg/Kg-bw/day LOAEL for chicken / 5 to estimate TRV / 5 for species	Asmatullah, et. al., 1999
	Cobalt	1.10E+00	3, 5	4-week NOAEL of 16.7 mg/Kg-bw/day for duck / 3 for duck TRV / 5 for species	Van Vleet 1982
	Copper	5.00E-01	100	LD50 of 50mg/Kg-bw/day for red-wing blackbird / 100 for chronic NOAEL	Schafer, et. al., 1983
	Lead	9.30E-01	3	11-day NOAEL of 2.8 mg/Kg-bw/day for starling / 3 for TRV	Osborn, et. al., 1983
	Manganese	7.30E+00	1	7.3 mg/Kg-bw/day required dose for successful reproduction	Offiong and Abed, 1980
	Mercury	2.90E-01	3	76-day NOAEL of 0.88 mg/Kg-bw/day for finches / 3 for TRV	Scheuhammer 1988
	Nickel	2.59E+01	5	90-day NOAEL of 129.5 mg/Kg-bw/day for mallards / 5 for species	Eastin and O'Shea, 1981
	Selenium	2.00E-01	5	11 - 12 week NOAEL of 1 mg/Kg-bw/day for ducks / 5 for species	Heinz, et. al., 1987
	Silver	5.50E-01	5	4-week NOAEL of 8.3 mg/Kg-bw/day for ducks / 5 for species	Van Vleet 1982
	Vanadium	1.30E-01	5	3-week NOAEL of 0.67 mg/Kg-be /day for chickens / 5 for species	Romoser, et. al., 1961
	Zinc	2.50E+01	5	12 and 44-week NOAEL of 125 mg/Kg-bw/day for chickens / 5 for species	Stahl, et. al., 1990
	Cyanide (total)	9.00E-02	100	LC50 of 9 mg/Kg-bw/day for starlings / 100 for NOAEL	Wiemeyer, et. al., 1986
VOCs	Benzene	1.00E-01	5, 100	103-week NOAEL of 50 mg/Kg-bw/day for rodents / 5 for large mammals / 100 for birds	Huff, et. al., 1989
	Carbon disulfide	5.00E-01	5, 100	10-day NOAEL of 25 mg/Kg-bw/day for rabbits / 5 for chronic NOAEL / 100 for birds	ATSDR, 1996
	Carbon tetrachloride	1.50E+00	100	2-year NOAEL of 15 mg/Kg-bw/day for rats / 100 for birds	Alumot, et. al., 1976
	Ethylbenzene	1.00E-01	5	90-day NOAEL of 0.53 mg/Kg-bw/day for quail for hexachlorobenzene / 5 for extrapolation across compounds	Vos, et. al., 1971
	Methyl Tert Butyl Ether	9.00E+01	100	90-day NOAEL of 900 mg/Kg-bw/day for rats / 100 for birds	Robinson, et. al., 1990
	trans-1,2-Dichloroethene	5.62E+00	5, 100	90-day NOAEL of 2809 mg/Kg-bw/day for mice / 5 large mammals / 100 for birds	Hayes, et. al., 1987
	Xylene	5.00E+01	100	103-week NOAEL of 500 mg/Kg-bw/day for rodents / 100 for birds	ATDSR, 1995
SVOCs	2,4,6-Trichlorophenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	2,4-Dichlorophenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	4-Methylphenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	Biphenyl	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	bis(2-chloroethyl)ether	5.00E-02	5, 100	78-week NOAEL of 25 mg/Kg-bw/day for rats / 5 for medium mammals / 100 for birds	Weisburger, et. al., 1981
	bis(2-ethylhexyl)phthalate	1.02E+01	15, 5	4-week LOAEL of 763 mg/Kg-bw/day for chicken / 15 for chronic NOAEL / 5 for species	Wood and Bitman, 1984
	Carbazole	5.00E-01	100, 100	LDLo of 500 mg/Kg-bw for rats / 100 for chronic NOAEL / 100 for birds	Sax, 1984
	Dibenzofuran	1.02E+00	100	LC50 of >102 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
	Di-n-butylphthalate	4.45E+00	3, 5	30-day NOAEL of 66.7 mg/Kg-bw/day for starlings / 3 for chronic NOAEL / 5 for species	O'Shea and Stafford, 1980
	Hexachlorobenzene	1.10E-01	5	90-day NOAEL of 0.53 mg/Kg-bw/day for quail for hexachlorobenzene / 5 for extrapolation across compounds	Vos, et. al., 1971
	Hexachlorobutadiene	1.20E+00	5	90-day NOAEL of 6 mg/Kg-bw/day for quail / 5 for species	Schwetz, et. al., 1974
	N-Nitrosodiphenylamine	5.00E+00	100	100-week NOAEL of 50 mg/Kg-bw/day for rats / 100 for birds	ATSDR, 1991
	Pentachlorophenol	5.50E+00	5	8-week NOAEL of 27.4 mg/Kg-bw/day for chickens / 5 for species	Prescott, et. al., 1982
PAHs	2-Methylnaphthalene	1.20E+00	5	Naphthalene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Acenaphthene	1.01E+00	100	LC50 of >101 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
	Acenaphthylene	2.02E-01	5	Acenaphthene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Anthracene	1.11E+00	100	LC50 of >111 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
	Benzo(a)anthracene	1.00E-02	15, 100	5-week LOAEL of 1.5 mg/Kg-bw/day for mice / 15 for chronic NOAEL / 100 for birds	ATSDR 1993
	Benzo(a)pyrene	6.70E-02	15, 5, 100	9-day LOAEL of 10 mg/Kg-bw/day for mice / 15 for NOAEL / 100 for birds	Mackenzie & Angevine, 1981
	Benzo(b)fluoranthene	4.00E-01	10, 5, 100	chronic carcinogenicity of 40 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 100 for birds	Sims & Overcash, 1983
	Benzo(g,h,i)perylene	1.30E-02	5	Benzo(a)pyrene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Benzo(k)fluoranthene	7.20E-01	10, 5, 100	chronic carcinogenicity of 72 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 large mammals / 100 for birds	Sims & Overcash, 1983
	Chrysene	9.90E-01	10, 100	carcinogenicity of 99 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 100 for birds	Sims & Overcash, 1983
	Dibenz(a,h)anthracene	1.71E+00	3, 5, 100	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 100 for birds	ATSDR 1995
	Fluoranthene	1.00E+01	5, 100	13-week NOAEL of 500 mg/kg-bw/day for mice / 5 for chronic NOAEL / 100 for birds	ATSDR 1995
	Fluorene	1.01E+00	100	LC50 of >101 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
	Naphthalene	6.20E+00	5	TRV of 30.8 mg/Kg-bw/day for mallards / 5 for species	Patton and Dieter, 1980
	Phenanthrene	1.13E+00	100	LC50 of >113 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
	Pyrene	1.71E+01	3, 100	10-day NOAEL of 514 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 100 for birds	ATSDR 1995
	Total PAHs	7.10E-01	1	22-week NOAEL of 0.71 mg/Kg-bw/day for ducks	Stubblefield, et. al., 1995
PCBs	Aroclor-1016	3.00E-02	100	247-day NOAEL of 3 mg/Kg-bw/day for mink / 100 for birds	Ringer, et. al., 1981
	Aroclor-1242	1.80E-01	10, 10	12-week LOAEL of 18.75 mg/Kg-bw/day for mallards / 10 for chronic NOAEL / 10 for species	Haseltine and Prouty, 1980
	Aroclor-1248	9.00E-02	5	1.5-year NOAEL of 0.45 mg/Kg-bw/day / 5 for species	McLane and Hughes, 1980
	Aroclor-1254	1.41E-01	2000	56-day NOAEL of 24 mg/Kg-bw/day for finches	Presst, et. al., 1970
	Aroclor-1260	4.70E-01	10	18-month NOAEL yielding TRV of 4.7 mg/Kg-bw/day for chickens / 10 for species	Keplinger, et. al., 1971
	Total PCBs	1.34E-04	10, 100	182-day LOAEL of 0.134 mg/Kg-bw/day for mink / 10 for chronic NOAEL / 100 for birds	Heaton et. al., 1995
Pesticides	4,4'-DDE	2.70E-01	5	1.5-year NOAEL of 1.36 mg/Kg-bw/day for ducks / 5 for species	Heath, et. al., 1972
	4,4'-DDT	3.22E+00	500	5-day LC50 of 1612 mg/Kg for rails / 500 for NOAEL	Van Velzen & Kreitzer, 1975
	Aldrin	2.40E-01	100	LD50 of 23.7 mg/Kg-bw for starlings / 100 for chronic NOAEL	Schafer, et. al., 1983
	Alpha-chlordane	5.00E-02	100	14-day LD50 for starlings of 5.33 mg/Kg-bw/day / 100 for chronic NOAEL	Eisler, 1990
	beta-BHC	3.00E+00	10	30-day EMLD of 30 mg/Kg-bw/day for mallard / 10 for chronic NOAEL	Hudson, et. al., 1984
	Dieldrin	5.60E-02	5	2-year NOAEL of 0.28 mg/Kg-bw/day for pigeons / 5 for species	Ahmed, et. al., 1978
	Endosulfan I	1.30E-02	100, 5	LD50 of 6.47 mg/Kg for mallards / 100 to estimate NOAEL / 5 for species	Hudson, et. al., 1972
	Endosulfan II	1.30E-02	100, 5	LD50 of 6.47 mg/Kg for mallards / 100 to estimate NOAEL / 5 for species	Hudson, et. al., 1972
	Endrin	2.00E-02	5	10-week NOAEL of 0.1 mg/Kg-bw/day for pheasant / 5 for species	Genelly and Rudd 1956
	Endrin ketone	2.00E-02	5	Endrin value for ground feeding birds / 5	DeWitt 1956
	gamma-BHC	1.20E-01	100, 10	96-hour LD50 of 120 mg/Kg-bw for quail / 100 for chronic NOAEL / 10 for species	Dahlen and Haugen 1954
	Gamma-chlordane	5.00E-02	100	14-day LD50 for starlings of 5.33 mg/Kg-bw/day / 100 for chronic NOAEL	Eisler, 1990
	Heptachlor	1.81E+00	100	LD50 of 181 mg/kg for American woodcock / 100 to estimate NOAEL	Stickel, et. al., 1956
	Methoxychlor	3.75E+01	100	5-day NOAEL of 3750 mg/Kg-bw/day for robins / 100 for chronic NOAEL	Hunt & Sacho, 1969
	Toxaphene	4.16E-02	10, 10	74-day NOAEL of 4.16 mg/Kg-bw/day for pheasants / 10 for chronic NOAEL / 10 for species	Genelly and Rudd, 1956

APPENDIX I TABLE

UNCERTAINTY FACTORS, RATIONALE AND SOURCES, USED TO CALCULATE TOXICITY REFERENCE VALUES
STAR LAKE CANAL SUPERFUND SITE
JEFFERSON COUNTY, TEXAS

BROWN PELICAN

	CONSTITUENTS	TRV	UF	RATIONALE	SOURCE
Metals	Aluminum	7.36E+01	1	NOAEL of 73.6 mg/Kg-bw/day for turtledoves	Carriere et al. 1985
Metals	Antimony	8.40E-03	100	NOAEL of 84 mg/Kg-bw/day for dogs / 10 for uncertainty / 10 chronic NOAEL / 100 for birds	ASTDR, 1990
Metals	Arsenic	9.30E-01	3, 5	8-week NOAEL of 14 mg/Kg-bw/day for mallards / 3 for chronic NOAEL / 5 for species	Stanley, et. al., 1994
Metals	Barium	1.39E+01	3, 5	4-week NOAEL of 208 mg/Kg-bw/day for chicken / 3 for chronic NOAEL / 5 for species	Sample, et. al,1996
Metals	Beryllium	5.16E-02	5, 100	NOAEL of 25.8 mg/Kg-bw/day / 5 to extrapolate form small mammal / 100 for birds	Morgareidge et al. 1977; Nagy 1987; Schroeder and Mitchner 1975
Metals	Cadmium	1.45E-01	10	90-day NOAEL of 1.45 mg/Kg-bw/day / 10 to extrapolate form Duck TRV	Powell et al. 1964
Metals	Chromium VI	5.40E-01	5	5-month NOAEL of 2.71 mg/Kg-bw/day for black ducks / 5 for species	Eisler, 1986
Metals	Cobalt	1.10E+00	3, 5	4-week NOAEL of 16.7 mg/Kg-bw/day for duck / 3 for chronic NOAEL / 5 for species	Van Vleet 1982
Metals	Copper	1.80E+00	3, 5	40-week NOAEL of 18 mg/Kg-bw/day for groundfeeding birds / 10 for species	Jackson and Stevenson 1981
Metals	Lead	3.64E+02	5	12-week NOAEL of 2.2 mg/Kg-bw/day for mallards / 5 for species	Finley, et. al., 1976
Metals	Manganese	7.30E+00	1	7.3 mg/Kg-bw/day required dose for successful reproduction	Offiong and Abed, 1980
Metals	Mercury	3.50E-02	5	93-day LOAEL of 0.18 mg/Kg-bw/day for great egrets / 5 for NOAEL	Bouton, et. al., 1999
Metals	Nickel	2.59E+01	5	90-day NOAEL of 129.5 mg/Kg-bw/day for mallards / 5 for species	Eastin and O'Shea, 1981
Metals	Selenium	2.00E-01	5	11-12 week NOAEL of 1.0 mg/Kg-bw/day for mallards / 5 for inter-taxon variability	Heinz, et. al., 1987
Metals	Silver	5.50E-01	5	4-week NOAEL of 8.3 mg/Kg-bw/day for ducks / 5 for species	Van Vleet 1982
Metals	Vanadium	6.70E-02	10	3-week NOAEL of 8.8 mg/Kg-bw/day* 0.038 Kg/day (ingestion rate for chicks)/0.5 Kg (average body weight of chicks at end of experiment) for a NOAEL of 0.67 mg/Kg-bw/day / 10 for inter-taxon variability	Romoser et al. 1961
Metals	Zinc	4.10E+00	5, 5	60-day LOAEL of 125 mg/Kg-bw/day for mallards / 5 for NOAEL / 5 for species	Gasaway and Buss, 1972
Metals	Cyanide (total)	1.43E-02	100	LD50 of 1.43 mg/Kg-bw for mallards / 100 for NOAEL	Eisler, 1991
VOCs	Benzene	1.00E-01	5, 100	103-week NOAEL of 50 mg/Kg-bw/day for rodents / 5 for large mammals / 100 for birds	Huff, et. al., 1989
VOCs	Carbon disulfide	1.00E-02	5, 5, 100	10-day NOAEL of 25 mg/Kg-bw/day for rabbits / 5 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR, 1996
VOCs	Carbon tetrachloride	3.00E-02	5, 100	2-year NOAEL of 15 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	Alumot, et. al., 1976
VOCs	Ethylbenzene	1.00E-01	5	90-day NOAEL of 0.53 mg/Kg-bw/day for quail for hexachlorobenzene / 5 for extrapolation across compounds	Vos, et. al., 1971
VOCs	Methyl Tert Butyl Ether	1.80E+00	5, 100	90-day NOAEL of 900 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	Robinson, et. al., 1990
VOCs	trans-1,2-Dichloroethene	5.62E+00	5, 100	90-day NOAEL of 2809 mg/Kg-bw/day for mice / 5 large mammals / 100 for birds	Hayes, et. al., 1987
VOCs	Xylene	1.00E+00	5, 100	103-week NOAEL of 500 mg/Kg-bw/day for rodents / 5 for large mammals / 100 for birds	ATDSR, 1995
SVOCs	2,4,6-Trichlorophenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
SVOCs	2,4-Dichlorophenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
SVOCs	4-Methylphenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
SVOCs	Biphenyl	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
SVOCs	bis(2-chloroethyl)ether	5.00E-02	5, 100	78-week NOAEL of 25 mg/Kg-bw/day for rats / 5 for medium mammals / 100 for birds	Weisburger, et. al., 1981
SVOCs	bis(2-ethylhexyl)phthalate	1.02E+01	15, 5	4-week LOAEL of 763 mg/Kg-bw/day for chicken / 15 for chronic NOAEL / 5 for species	Wood and Bitman, 1984
SVOCs	Carbazole	1.00E-02	100, 5, 100	LDLo of 500 mg/Kg-bw for rats / 100 for chronic NOAEL / 5 for large mammals / 100 for birds	Sax, 1984
SVOCs	Dibenzofuran	1.02E+00	100	LC50 of >102 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
SVOCs	Di-n-butylphthalate	1.02E+00	5, 5	4-week LOAEL of 763 mg/Kg-bw/day for chickens / 3 for chronic LOAEL / 5 for chronic NOAEL / 5 for TRV	Wood and Bitman, 1984
SVOCs	Hexachlorobenzene	1.10E-01	5	90-day NOAEL of 0.53 mg/Kg-bw/day for quail for hexachlorobenzene / 5 for extrapolation across compounds	Vos, et. al., 1971
SVOCs	Hexachlorobutadiene	1.20E+00	5	90-day NOAEL of 6 mg/Kg-bw/day for quail / 5 for species	Schwetz, et. al., 1974
SVOCs	N-Nitrosodiphenylamine	1.00E-01	5, 100	100-week NOAEL of 50 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	ATSDR, 1991
SVOCs	Pentachlorophenol	5.50E+00	5	8-week NOAEL of 27.4 mg/Kg-bw/day for chickens / 5 for species	Prescott, et. al., 1982
PAHs	2-Methylnaphthalene	1.20E+00	5	Naphthalene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
PAHs	Acenaphthene	6.20E+00	5	7-month NOAEL of 30.8 mg/kg-bw for mallards / 5 for species	Patton and Dieter, 1980
PAHs	Acenaphthylene	6.20E+00	5	7-month NOAEL of 30.8 mg/kg-bw for mallards / 5 for species	Patton and Dieter, 1980
PAHs	Anthracene	2.20E-01	100, 5	LC50 of >111 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL / 5 for species	Schafer, et. al., 1983
PAHs	Benzo(a)anthracene	2.00E-04	15, 5, 100	5-week LOAEL of 1.5 mg/Kg-bw/day for mice / 15 for chronic NOAEL / 5 for large mammal / 100 for birds	ATSDR 1993
PAHs	Benzo(a)pyrene	1.30E-03	15, 5, 100	9-day LOAEL of 10 mg/Kg-bw/day for mice / 15 for NOAEL / 5 for large mammals / 100 for birds	Mackenzie & Angevine, 1981
PAHs	Benzo(b)fluoranthene	8.00E-03	10, 5, 100	chronic carcinogenicity of 40 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 large mammals / 100 for birds	Sims & Overcash, 1983
PAHs	Benzo(g,h,i)perylene	3.00E-04	5	Benzo(a)pyrene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
PAHs	Benzo(k)fluoranthene	1.44E-02	10, 5, 100	chronic carcinogenicity of 72 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 large mammals / 100 for birds	Sims & Overcash, 1983
PAHs	Chrysene	1.98E-02	10, 5, 100	carcinogenicity of 99 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 for large mammals / 100 for birds	Sims & Overcash, 1983
PAHs	Dibenz(a,h)anthracene	3.40E-02	3, 5, 100	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
PAHs	Fluoranthene	2.00E-01	5, 5, 100	13-week NOAEL of 500 mg/kg-bw/day for mice / 5 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
PAHs	Fluorene	2.02E-01	100, 5	LC50 of >101 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL / 5 for species	Schafer, et. al., 1983
PAHs	Naphthalene	6.20E+00	5	7-month NOAEL of 30.8 mg/Kg-bw/day for mallards / 5 for species	Patton and Dieter, 1980
PAHs	Phenanthrene	6.20E+00	5	7-month NOAEL of 30.8 mg/kg-bw for mallards / 5 for species	Patton and Dieter, 1980
PAHs	Pyrene	3.43E-01	3, 5, 100	10-day NOAEL of 514 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
PAHs	Total PAHs	5.45E+01	1	[LOAEL of 4000 mg/Kg-bw/day/* 0.15 kg/day (daily consumption of food)/ 1.1 Kg (weight of adult mallard)]/ 10 for chronic NOAEL	Eisler, 1987; Welty, 1982; Terres, 1982
PCBs	Aroclor-1016	3.00E-02	100	247-day NOAEL of 3 mg/Kg-bw/day for mink / 100 for birds	Ringer, et. al., 1981
PCBs	Aroclor-1242	1.88E+00	10	12-week LOAEL of 18.75 mg/Kg-bw/day for mallards / 10 for chronic NOAEL	Haseltine and Prouty, 1980
PCBs	Aroclor-1248	9.00E-02	5	1.5-year NOAEL of 0.45 mg/Kg-bw/day / 5 for species	McLane and Hughes, 1980
PCBs	Aroclor-1254	1.41E+00	1	1.5-year NOAEL of 1.41 mg/kg-bw for mallards	Heath, et. al., 1972
PCBs	Aroclor-1260	1.98E+00	100, 10	5-day LC50 for mallards of 1975 mg/Kg-bw / 100 for chronic NOAEL / 10 for species	Heath, et. al., 1972
PCBs	Total PCBs	1.34E-04	10, 100	182-day LOAEL of 0.134 mg/Kg-bw/day for mink / 10 for chronic NOAEL / 100 for birds	Heaton et. al., 1995
Pesticides	4,4'-DDE	1.36E-01	1, 10	1.5-year NOAEL of 1.36 mg/Kg-bw/day for ducks / 10 intertaxon variability	Heath, et. al., 1972
Pesticides	4,4'-DDT	3.22E+00	500	5-day LC50 of 1612 mg/Kg for mallards / 500 to estimate NOAEL	Van Velsen and Kreitzer, 1975
Pesticides	Aldrin	1.00E-02	5	7-week NOAEL of 0.05 mg/Kg-bw/day for pheasants / 5 for species	Hall, et. al., 1971
Pesticides	Alpha-chlordane	8.60E-01	100, 10	5-day LD50 for mallards of 858 mg/Kg-bw / 100 for chronic NOAEL / 10 for species	Eisler, 1990
Pesticides	beta-BHC	2.40E-01	10	30-day EMLD of 30 mg/Kg-bw/day for adult mallard duck / 10 for chronic NOAEL	Hudson et al. 1984
Pesticides	Dieldrin	5.60E-02	5	2-year NOAEL of 0.28 mg/Kg-bw/day for pigeons / 5 for species	Ahmed, et. al., 1978
Pesticides	Endosulfan I	1.30E-02	100, 5	LD50 of 6.47 mg/Kg for mallards / 100 to estimate NOAEL / 5 for species	Hudson, et. al., 1972
Pesticides	Endosulfan II	1.30E-02	100, 5	LD50 of 6.47 mg/Kg for mallards / 100 to estimate NOAEL / 5 for species	Hudson, et. al., 1972
Pesticides	Endrin	1.40E-02	10	6-month NOAEL of 0.14 mg/Kg-bw/day/ 10 inter-taxon variability	Spann et al. 1986
Pesticides	Endrin ketone	1.40E-02	10	6-month NOAEL of 0.14 mg/Kg-bw/day/ 10 inter-taxon variability	Spann et al. 1986
Pesticides	gamma-BHC	1.20E-01	100, 10	96-hour LD50 of 120 mg/Kg-bw for quail / 100 for chronic NOAEL / 10 for species	Dahlen and Haugen 1954
Pesticides	Gamma-chlordane	8.60E-01	100	5-day LD50 for mallards of 858 mg/Kg-bw / 100 for chronic NOAEL	Eisler, 1990
Pesticides	Heptachlor	3.60E-01	100, 5	LD50 of 181 mg/kg for American woodcock / 100 to estimate NOAEL / 5 for species	Stickel, et. al., 1956
Pesticides	Methoxychlor	4.00E+00	500	single dose LC50 for mallards of >2000 mg/Kg-bw / 500 for chronic NOAEL	Hudson, et. al., 1984
Pesticides	Toxaphene	4.16E-02	10, 10	74-day NOAEL of 4.16 mg/Kg-bw/day for pheasants / 10 for chronic NOAEL / 10 for species	Genelly and Rudd, 1956

UNCERTAINTY FACTORS, RATIONALE AND SOURCES, USED TO CALCULATE TOXICITY REFERENCE VALUES
STAR LAKE CANAL SUPERFUND SITE
JEFFERSON COUNTY, TEXAS

BULLFROG

	CONSTITUENTS	TRV	UF	RATIONALE	SOURCE
Metals	Aluminum	1.90E-01	1, 100	390-day NOAEL of 19 mg/Kg-bw/day for mice / 100 for amphibians	Ondreicka et al. 1966
	Antimony	3.50E-03	1, 100	Full life cycle NOAEL for 30 months for mice / 100 for amphibians	Schroeder et al. 1968
	Arsenic	2.35E-02	1, 100	2-year NOAEL of 2.35 mg/Kg-bw/day for doge / 100 for amphibians	Byron et al. 1967
	Barium	6.35E-01	1, 100	92-day NOAEL of 63.5 mg/Kg-bw/day for rats / 100 for amphibians	Dietz et al. 1992
	Beryllium	2.58E-01	1, 100	2-year NOAEL of 25.8 mg/Kg-bw/day for rats / 100 for amphibians	Morgareidge et al. 1977, Nagy 1987, Schroeder and Michener 1975
	Cadmium	4.00E-03	1, 100	3-year NOAEL of 0.40 mg/Kg-bw/day for mice / 100 for amphibians	Schroeder et al. 1964
	Chromium VI	6.60E-02	5, 100	LOAEL of 32.7 mg/Kg-bw/day for rats / 5 for NOAEL / 100 for amphibians	Kanojia et al. 1998
	Cobalt	1.67E-02	3, 100	69-day NOAEL of 5 mg/Kg-bw/day for rats / 3 chronic NOAEL of 1.67/ 100 for amphibians	Nation et al. 1983
	Copper	8.47E-02	1, 100	850-day NOAEL of 8.47 for mice / 100 for amphibians	Massie and Aiello 1984
	Lead	9.00E-03	1, 100	9-month NOAEL of 0.90 mg/Kg-bw/day for rats / 100 for amphibians	Grant et al. 1980; Kimmel et al. 1980
	Manganese	4.40E-01	1, 100	224-day NOAEL of 44-88 mg/kg-bw/day for rats / 100 for amphibians	Laskey et al. 1982
	Mercury	5.00E-04	1, 100	26-month NOAEL of 0.05 mg/Kg-bw-day for rats / 100 for amphibians	Munro et al. 1980
	Nickel	4.75E-01	1, 100	2-year NOAEL of 47.5 mg/Kg-bw/day for rats / 100 for amphibians	Ambrose et al. 1976
	Selenium	9.00E-04	5, 100	LOAEL of 0.45 mg/Kg-bw/day for mice / 5 for chronic NOAEL of 0.09 / 100 for amphibians	Schroeder and Mitchner 1971; Calder and Braun 1983
	Silver	4.44E-01	5, 100	LOAEL of 222.2 mg/kg-bw/day for rats / 5 for NOAEL of 44.4 / 100 for amphibians	ATSDR, 1990
	Vanadium	2.10E-02	1, 100	NOAEL of 2.1 mg/Kg-bw/day for rats / 100 for amphibians	Domingo et al. 1986
	Zinc	3.17E-01	1, 100	NOAEL of 31.7 mg/Kg-bw/day for rats / 100 for amphibians	Maita et al. 1981
	Cyanide (total)	1.35E-01	5, 100	LOAEL of 67.5 mg/Kg-bw/day rats / 5 for NOAEL / 100 for amphibians	Phibrick et al. 1979; Nagy 1987
VOCs	Benzene	5.00E-01	1, 100	103-week NOAEL for 50 mg/Kg-bw/day for rats and mice / 100 for amphibians	Huff et al. 1989
	Carbon disulfide	5.00E-02	5, 100	10-day LOAEL of 25 mg/Kg-bw/day for New Zealand white rabbits / 5 for NOAEL / 100 for amphibians	ATSDR, 1996
	Carbon tetrachloride	1.50E-01	1, 100	2-year NOAEL of 15 mg/Kg-bw/day for rats / 100 for amphibians	Alumot et al. 1976
	Ethylbenzene	9.50E-02	500, 100	LD50 of 4769 mg/kg for rats / 500 for chronic NOAEL / 100 for amphibians	ATSDR, 1999
	Methyl Tert Butyl Ether	9.00E+00	1, 100	90-day NOAEL of 900 mg/Kg-bw/day for rats / 100 for amphibians	Robinson et al. 1990
	trans-1,2-Dichloroethene	5.62E+00	5, 100	90-day NOAEL of 2809 mg/Kg-bw/day for mice / 5 med.-large mammals / 100 for amphibians	Hayes et al. 1987
	Xylene	5.00E+00	1, 100	103-week NOAEL for 500 mg/Kg-bw/day for rats / 100 for amphibians	ATSDR, 1995
SVOCs	2,4,6-Trichlorophenol	6.00E-03	5, 100	62-day NOAEL of 3 mg/Kg-bw/day for rats / 5 for other phenols / 100 for amphibians	ATSDR, 1994
	2,4-Dichlorophenol	6.00E-03	5, 100	62-day NOAEL of 3 mg/Kg-bw/day for rats / 5 for other phenols / 100 for amphibians	ATSDR, 1994
	4-Methylphenol	6.00E-03	5, 100	62-day NOAEL of 3 mg/Kg-bw/day for rats / 5 for other phenols / 100 for amphibians	ATSDR, 1994
	Biphenyl	6.00E-03	5, 100	62-day NOAEL of 3 mg/Kg-bw/day for rats / 5 for other phenols / 100 for amphibians	ATSDR, 1994
	bis(2-chloroethyl)ether	2.50E-01	1, 100	78 week NOAEL of 25 mg/Kg-bw/day for rats / 100 or amphibians	Weisburger et al. 1981
	bis(2-ethylhexyl)phthalate	1.32E-01	1, 100	105-day NOAEL of 13.2 mg/Kg-bw/day / 100 for amphibians	Lamb et al. 1987
	Carbazole	5.00E-02	100, 100	LDLo of 500 mg/Kg-bw/day for rate / 100 for chronic NOAEL/ 100 for amphibians	Sax 1984
	Dibenzofuran	1.20E-02	5, 5, 100	103-week LOAEL of 30 mg/Kg-bw/day for rats and mice / 5 for chronic NOAEL/ 5 extrapolation across compound / 100 for amphibians	ATSDR, 1990
	Di-n-butylphthalate	3.95E+00	1, 100	105-day NOAEL of 395 mg/Kg-bw/day for mice / 100 for amphibians	Lamb et al. 1987
	Hexachlorobenzene	2.80E-02	1, 100	2-year NOAEL of 2.8 mg/Kg-bw/day for rats / 100 for amphibians	Grant et al. 1977
	Hexachlorobutadiene	2.00E-03	1, 100	2 year and 5 month NOAELs of 0.2 mg/Kg-bw/day for rats / 100 for amphibians	Schwetz et al. 1977
	N-Nitrosodiphenylamine	5.00E-01	1, 100	100-week NOAEL of 50 mg/Kg-bw/day for rats / 100 for amphibians	ATSDR, 1991
	Pentachlorophenol	3.00E-02	1, 100	62-day NOAEL of 3 mg/Kg-bw/day for rats / 100 for amphibians	ATSDR, 1994
PAHs	2-Methylnaphthalene	3.66E-02	5, 100	Small mammal TRV for naphthalene 90-day NOAEL of 18.3 mg/Kg-bw/day / 5 for extrapolation across compounds / 100 for amphibians	Shopp et al. 1984
	Acenaphthene	1.71E-01	3, 100	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 100 for amphibians	ATSDR, 1993
	Acenaphthylene	3.40E-02	3, 5, 100	Acenaphthene 10-day NOAEL of 51.4 mg/Kg-bw/day for rate / 3 for chronic NOAEL/ 5 for extrapolation across compound / 100 for amphibians	ATSDR, 1993
	Anthracene	2.00E+00	5, 100	13-week NOAEL of 1000 mg/Kg-bw/day for mice / 5 for chronic NOAEL / 100 for amphibians	ATSDR, 1995
	Benzo(a)anthracene	1.00E-03	3, 5, 100	5 week LOAEL of 1.5 mg/Kg-bw/day for mice / 3 chronic LOAEL/ 5 chronic NOAEL/ 100 for amphibians	ASTDR, 1993
	Benzo(a)pyrene	6.70E-03	3, 5, 100	9-day LOAEL of 10 mg/Kg-bw/day for mice / 3 for chronic LOAEL/ 5 for chronic NOAEL/ 100 for amphibians	Mackenzie and Angevine, 1981
	Benzo(b)fluoranthene	4.00E-02	10, 100	chronic oral carcinogenicity of 40 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 100 for amphibians	Sims and Overcash, 1983
	Benzo(g,h,i)perylene	1.30E-03	3, 5, 5, 100	Benzo(a)pyrene TRV-9-day LOAEL of 10 mg/Kg-bw/day for mice / 3 for chronic LOAEL / 5 for chronic NOAEL / 5 for extrapolation across compounds / 100 for amphibians	Mackenzie and Angevine, 1981
	Benzo(k)fluoranthene	7.20E-02	10, 100	chronic oral carcinogenicity of 72.0 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 100 for amphibians	Sims and Overcash, 1983
	Chrysene	9.90E-02	10, 100	chronic oral carcinogenicity of 99.0 mg/Kg-bw/day for rodent / 10 for chronic NOAEL/ 100 for amphibians	Sims and Overcash, 1983
	Dibenz(a,h)anthracene	1.71E-01	3, 100	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 100 for amphibians	ASTDR, 1995
	Fluoranthene	1.00E+00	5, 100	13 week NOAEL of 500 mg/Kg-bw/day for mice / 5 for chronic NOAEL / 100 for amphibians	ASTDR, 1995
	Fluorene	1.00E+00	5, 100	13 week NOAEL of 500 mg/Kg-bw/day for mice / 5 for chronic NOAEL/ 100 for amphibians	ASTDR, 1995
	Naphthalene	1.83E-01	1, 100	90-day NOAEL of 18.3 mg/Kg-bw/day for mice / 100 for amphibians	Shopp et al. 1984
	Phenanthrene	1.71E+00	3, 100	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 100 for amphibians	ASTDR, 1995
	Pyrene	1.71E+00	3, 100	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 100 for amphibians	ASTDR, 1995
	Total PAHs	5.45E-01	10, 100	[LOAEL of 4000 mg/Kg-bw/day/* 0.15 kg/day (daily consumption of food)/ 1.1 Kg (weight of adult mallard)] / 10 for chronic NOAEL/ 100	Eisler, 1987; Welty, 1982; Terres, 1982
PCBs	Aroclor-1016	3.00E-02	1, 100	247-day NOAEL of 3 mg/Kg-bw/day for minks / 100 for amphibians	Ringer et al. 1981
	Aroclor-1242	4.60E-03	10, 100	36 week NOAEL of 4.6 mg/Kg-bw/day for rats / 10 for chronic NOAEL / 100 for amphibians	Jonsson et al. 1976
	Aroclor-1248	2.60E-02	5, 100	5 week LOAEL of 13 mg/Kg-bw/day for mice / 5 chronic NOAEL / 100 for amphibians	ATSDR, 1991
	Aroclor-1254	9.00E-04	10, 100	62-69-day LOAEL of 9-10 mg/Kg-bw/day for adult American Kestrels / 10 for chronic NOAEL / 100 for amphibians	Bird et al. 1983
	Aroclor-1260	7.40E-02	1, 100	NOAEL of 7.4 m/kg-bw/day for rats / 100 for amphibians	Linder et al. 1974
	Total PCBs	1.34E-04	10, 100	182-day LOAEL of 0.134 mg/Kg-bw/day for mink / 10 for chronic NOAEL / 100 for amphibians	Heaton et al. 1995
Pesticides	4,4'-DDE	1.90E-02	10, 100	76 week LOAEL of 19 mg/Kg-bw/day for mice / 10 for chronic NOAEL / 100 for amphibians	NCI, 1978; ASTDR, 1992
	4,4'-DDT	4.00E-03	1, 100	NOAEL of 0.4 mg/Kg-bw/day for mice / 100 for amphibians	Kemeny 1969
	Aldrin	1.10E-03	1, 100	2-year NOAEL of 0.11 mg/Kg-bw/day for rats / 100 for amphibians	Treon and Cleveland 1955
	Alpha-chlordane	3.44E-02	[*0.0045, 0.0327], 100	NOAEL of 25 mg/Kg-bw/day for mice* 0.0045 Kg (daily consumption of dry feed) / 0.0327 Kg (average weight of mice at test termination/ 100 for amphibians	Eisler 1990 and Nagy 1987
	beta-BHC	2.80E-02	1, 100	13-week NOAEL of 2.8 mg/Kg-bw/day for rats / 100 for amphibians	Velson et al. 1986
	Dieldrin	2.40E-03	1, 100	NOAEL of 0.24 mg/Kg-bw/day for mice / 100 for amphibians	WHO, 1989
	Endosulfan I	2.60E-04	1, 100	LOAEL of 0.26 mg/Kg-bw/day for mice / 10 for chronic NOAEL / 100 for amphibians	ATSDR, 1990
	Endosulfan II	2.60E-04	1, 100	LOAEL of 0.26 mg/Kg-bw/day for mice / 10 for chronic NOAEL / 100 for amphibians	ATSDR, 1990
	Endrin	8.70E-03	1, 100	LC50 of 87 mg/kg for short-tail shrews / 100 for chronic NOAEL / 100 for amphibians	Blus 1978
	Endrin ketone	8.70E-03	1, 100	LC50 of 87 mg/kg for short-tail shrews / 100 for chronic NOAEL / 100 for amphibians	Blus 1978
	gamma-BHC	3.44E-02	1, 100	NOAEL of 7.39 m/kg-bw/day for rats / 100 for amphibians	Palmer et al. 1978
	Gamma-chlordane	3.44E-02	[*0.0045, 0.0327], 100	NOAEL of 25 mg/Kg-bw/day for mice* 0.0045 Kg (daily consumption of dry feed) / 0.0327 Kg (average weight of mice at test termination/ 100 for amphibians	Eisler 1990 and Nagy 1987
	Heptachlor	6.00E-03	10, 100	LOAEL of 6 mg/Kg-bw/day rats / 10 for chronic NOAEL / 100 for amphibians	ATSDR, 1991
	Methoxychlor	2.50E-01	100	NOAEL of 25 mg/Kg-bw/day for rate / 100 for amphibians	Gray et al. 1989
	Toxaphene	4.16E-03	10, 100	NOAEL of 4.16/ 10 for chronic NOAEL / 100 for amphibians	Genelly and Rudd 1956

UNCERTAINTY FACTORS, RATIONALE AND SOURCES, USED TO CALCULATE TOXICITY REFERENCE VALUES
STAR LAKE CANAL SUPERFUND SITE
JEFFERSON COUNTY, TEXAS

GREEN HERON

	CONSTITUENTS	TRV	UF	RATIONALE	SOURCE
Metals	Aluminum	7.36E+01	1	4-month NOAEL of 73.6 mg/Kg-bw/day for turtledove	Carriere, et. al., 1985
	Antimony	3.50E-03	100	Small Mammal Life Cycle NOAEL of 0.35 mg/Kg-bw/day	Schroeder, et. al. 1968
	Arsenic	9.30E-01	3, 5	8-week NOAEL of 14 mg/Kg-bw/day for mallards / 3 for chronic NOAEL / 5 for species	Stanley, et. al., 1994
	Barium	1.39E+01	3, 5	4-week NOAEL of 208 mg/Kg-bw/day for chicken / 3 for chronic NOAEL / 5 for species	Sample, et. al,1996
	Beryllium	5.16E-02	5, 100	2-year NOAEL of 25.8 mg/Kg-bw/day for rat divided by 5 for large mammal and by 100 for birds	Morgareidge, et. al., 1977
	Cadmium	2.90E-01	5	90-day NOAEL of 1.45 mg/Kg-bw/day for mallards / 5 for species	White and Finley, 1978
	Chromium VI	5.40E-01	5	5-month NOAEL of 2.71 mg/Kg-bw/day for black ducks / 5 for species	Eisler, 1986
	Cobalt	1.10E+00	3, 5	4-week NOAEL of 16.7 mg/Kg-bw/day for duck / 3 for chronic NOAEL / 5 for species	Van Vleet 1982
	Copper	1.80E+00	3, 10	4-week NOAEL of 83.3 mg/Kg-bw/day for duck / 3 for chronic NOAEL / 10 for species	Van Vleet, 1982
	Lead	3.64E+02	5	12-week NOAEL of 2.2 mg/Kg-bw/day for mallards / 5 for species	Finley, et. al., 1976
	Manganese	7.30E+00	1	7.3 mg/Kg-bw/day required dose for successful reproduction	Offiong and Abed, 1980
	Mercury	3.50E-02	5	93-day LOAEL of 0.18 mg/Kg-bw/day for great egrets / 5 for NOAEL	Bouton, et. al., 1999
	Nickel	2.59E+01	5	90-day NOAEL of 129.5 mg/Kg-bw/day for mallards / 5 for species	Eastin and O'Shea, 1981
	Selenium	1.00E+00	1	11 - 12 week NOAEL of 1 mg/Kg-bw/day for ducks	Heinz, et. al., 1987
	Silver	5.50E-01	5	4-week NOAEL of 8.3 mg/Kg-bw/day for ducks / 5 for species	Van Vleet 1982
	Vanadium	1.30E-01	5	3-week NOAEL of 0.67 mg/Kg-be /day for chickens / 5 for species	Romoser, et. al., 1961
	Zinc	4.10E+00	5, 5	60-day LOAEL of 125 mg/Kg-bw/day for mallards / 5 for NOAEL / 5 for species	Gasaway and Buss, 1972
	Cyanide (total)	1.43E-02	100	LD50 of 1.43 mg/Kg-bw for mallards / 100 for NOAEL	Eisler, 1991
VOCs	Benzene	1.00E-01	5, 100	103-week NOAEL of 50 mg/Kg-bw/day for rodents / 5 for large mammals / 100 for birds	Huff, et. al., 1989
	Carbon disulfide	1.00E-02	5, 5, 100	10-day NOAEL of 25 mg/Kg-bw/day for rabbits / 5 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR, 1996
	Carbon tetrachloride	3.00E-02	5, 100	2-year NOAEL of 15 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	Alumot, et. al., 1976
	Ethylbenzene	1.00E-01	5	90-day NOAEL of 0.53 mg/Kg-bw/day for quail for hexachlorobenzene / 5 for extrapolation across compounds	Vos, et. al., 1971
	Methyl Tert Butyl Ether	1.80E+00	5, 100	90-day NOAEL of 900 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	Robinson, et. al., 1990
	trans-1,2-Dichloroethene	5.62E+00	5, 100	90-day NOAEL of 2809 mg/Kg-bw/day for mice / 5 large mammals / 100 for birds	Hayes, et. al., 1987
	Xylene	1.00E+00	5, 100	103-week NOAEL of 500 mg/Kg-bw/day for rodents / 5 for large mammals / 100 for birds	ATDSR, 1995
SVOCs	2,4,6-Trichlorophenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	2,4-Dichlorophenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	4-Methylphenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	Biphenyl	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	bis(2-chloroethyl)ether	5.00E-02	5, 100	78-week NOAEL of 25 mg/Kg-bw/day for rats / 5 for medium mammals / 100 for birds	Weisburger, et. al., 1981
	bis(2-ethylhexyl)phthalate	1.02E+01	15, 5	4-week LOAEL of 763 mg/Kg-bw/day for chicken / 15 for chronic NOAEL / 5 for species	Wood and Bitman, 1984
	Carbazole	1.00E-02	100, 5, 100	LDLo of 500 mg/Kg-bw for rats / 100 for chronic NOAEL / 5 for large mammals / 100 for birds	Sax, 1984
	Dibenzofuran	1.02E+00	100	LC50 of >102 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
	Di-n-butylphthalate	1.02E+00	3, 5, 5	4-week LOAEL of 763 mg/Kg-bw/day for chickens / 3 for chronic LOAEL / 5 for chronic NOAEL / 5 for TRV	Wood and Bitman, 1984
	Hexachlorobenzene	1.10E-01	5	90-day NOAEL of 0.53 mg/Kg-bw/day for quail for hexachlorobenzene / 5 for extrapolation across compounds	Vos, et. al., 1971
	Hexachlorobutadiene	1.20E+00	5	90-day NOAEL of 6 mg/Kg-bw/day for quail / 5 for species	Schwetz, et. al., 1974
	N-Nitrosodiphenylamine	1.00E-01	5, 100	100-week NOAEL of 50 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	ATSDR, 1991
	Pentachlorophenol	5.50E+00	5	8-week NOAEL of 27.4 mg/Kg-bw/day for chickens / 5 for species	Prescott, et. al., 1982
PAHs	2-Methylnaphthalene	1.20E+00	5	Naphthalene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Acenaphthene	6.20E+00	5	7-month NOAEL of 30.8 mg/kg-bw for mallards / 5 for species	Patton and Dieter, 1980
	Acenaphthylene	6.20E+00	1	Used TRV for Acenaphthene / 1	Neff 1979; Sims & Overcash, 1983
	Anthracene	2.20E-01	100, 5	LC50 of >111 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL / 5 for species	Schafer, et. al., 1983
	Benzo(a)anthracene	2.00E-04	15, 5, 100	5-week LOAEL of 1.5 mg/Kg-bw/day for mice / 15 for chronic NOAEL / 5 for large mammal / 100 for birds	ATSDR 1993
	Benzo(a)pyrene	1.30E-03	15, 5, 100	9-day LOAEL of 10 mg/Kg-bw/day for mice / 15 for NOAEL / 5 for large mammals / 100 for birds	Mackenzie & Angevine, 1981
	Benzo(b)fluoranthene	8.00E-03	10, 5, 100	chronic carcinogenicity of 40 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 large mammals / 100 for birds	Sims & Overcash, 1983
	Benzo(g,h,i)perylene	3.00E-04	5	Benzo(a)pyrene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Benzo(k)fluoranthene	1.44E-02	10, 5, 100	chronic carcinogenicity of 72 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 large mammals / 100 for birds	Sims & Overcash, 1983
	Chrysene	9.90E-01	10, 5, 100	carcinogenicity of 99 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 for large mammals / 100 for birds	Sims & Overcash, 1983
	Dibenz(a,h)anthracene	3.40E-02	3, 5, 100	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Fluoranthene	2.00E-01	5, 5, 100	13-week NOAEL of 500 mg/Kg-bw/day for mice / 5 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Fluorene	2.02E-01	100, 5	LC50 of >101 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL / 5 for species	Schafer, et. al., 1983
	Naphthalene	6.20E+00	5	7-month NOAEL of 30.8 mg/Kg-bw/day for mallards / 5 for species	Patton and Dieter, 1980
	Phenanthrene	6.20E+00	5	7-month NOAEL of 30.8 mg/kg-bw for mallards / 5 for species	Patton and Dieter, 1980
	Pyrene	3.43E-01	3, 5, 100	10-day NOAEL of 514 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Total PAHs	7.10E-01	1	22-week NOAEL of 0.71 mg/Kg-bw/day for ducks	Stubblefield, et. al., 1995
PCBs	Aroclor-1016	3.00E-02	100	247-day NOAEL of 3 mg/Kg-bw/day for mink / 100 for birds	Ringer, et. al., 1981
	Aroclor-1242	1.88E+00	10	12-week LOAEL of 18.75 mg/Kg-bw/day for mallards / 10 for chronic NOAEL	Haseltine and Prouty, 1980
	Aroclor-1248	9.00E-02	5	1.5-year NOAEL of 0.45 mg/Kg-bw/day / 5 for species	McLane and Hughes, 1980
	Aroclor-1254	1.41E+00	1	1.5-year NOAEL of 1.41 mg/kg-bw for mallards	Heath, et. al., 1972
	Aroclor-1260	1.98E+00	100, 10	5-day LC50 for mallards of 1975 mg/Kg-bw / 100 for chronic NOAEL / 10 for species	Heath, et. al., 1972
	Total PCBs	1.34E-04	10, 100	182-day LOAEL of 0.134 mg/Kg-bw/day for mink / 10 for chronic NOAEL / 100 for birds	Heaton et. al., 1995
Pesticides	4,4'-DDE	1.36E+00	1	1.5-year NOAEL of 1.36 mg/Kg-bw/day for ducks	Heath, et. al., 1972
	4,4'-DDT	3.22E+00	500	5-day LC50 of 1612 mg/Kg for mallards / 500 to estimate NOAEL	Van Velsen and Kreitzer, 1975
	Aldrin	1.00E-02	5	7-week NOAEL of 0.05 mg/Kg-bw/day for pheasants / 5 for species	Hall, et. al., 1971
	Alpha-chlordane	8.60E+00	100, 10	5-day LD50 for mallards of 858 mg/Kg-bw / 100 for chronic NOAEL / 100 for birds	Eisler, 1990
	beta-BHC	3.00E+00	10	30-day EMLD of 30 mg/Kg-bw/day for mallard / 10 for chronic NOAEL	Hudson, et. al., 1984
	Dieldrin	5.60E-02	5	2-year NOAEL of 0.28 mg/Kg-bw/day for pigeons / 5 for species	Ahmed, et. al., 1978
	Endosulfan I	1.30E-02	100, 5	LD50 of 6.47 mg/Kg for mallards / 100 to estimate NOAEL / 5 for species	Hudson, et. al., 1972
	Endosulfan II	1.30E-02	100, 5	LD50 of 6.47 mg/Kg for mallards / 100 to estimate NOAEL / 5 for species	Hudson, et. al., 1972
	Endrin	1.40E-01	1	6-month NOAEL of 0.14 mg/Kg-bw/day for mallards	Spann, et. al., 1986
	Endrin ketone	1.40E-01	10	Endrin value for Herons and Ducks / 10 for species	Spann et al. 1986
	gamma-BHC	1.20E-01	100, 10	96-hour LD50 of 120 mg/Kg-bw for quail / 100 for chronic NOAEL / 10 for species	Dahlen and Haugen 1954
	Gamma-chlordane	8.60E+00	100, 10	5-day LD50 for mallards of 858 mg/Kg-bw / 100 for chronic NOAEL	Eisler, 1990
	Heptachlor	3.60E-01	100, 5	LD50 of 181 mg/kg for American woodcock / 100 to estimate NOAEL / 5 for species	Stickel, et. al., 1956
	Methoxychlor	4.00E+00	500	single dose LC50 for mallards of >2000 mg/Kg-bw / 500 for chronic NOAEL	Hudson, et. al., 1984
	Toxaphene	4.16E-02	10, 10	74-day NOAEL of 4.16 mg/Kg-bw/day for pheasants / 10 for chronic NOAEL / 10 for species	Genelly and Rudd, 1956

APPENDIX I TABLE

UNCERTAINTY FACTORS, RATIONALE AND SOURCES, USED TO CALCULATE TOXICITY REFERENCE VALUES
STAR LAKE CANAL SUPERFUND SITE
JEFFERSON COUNTY, TEXAS

MALLARD DUCK

	CONSTITUENTS	TRV	UF	RATIONALE	SOURCE
Metals	Aluminum	7.36E+01	1	4-month NOAEL of 73.6 mg/Kg-bw/day for turtledove	Carriere, et. al., 1985
	Antimony	3.50E-03	100	Small Mammal Life Cycle NOAEL of 0.35 mg/Kg-bw/day	Schroeder, et. al. 1968
	Arsenic	4.67E+00	3	8-week NOAEL of 14 mg/Kg-bw/day for mallards / 3 for chronic NOAEL	Stanley, et. al., 1994
	Barium	1.39E+01	3, 5	4-week NOAEL of 208 mg/Kg-bw/day for chicken / 3 for chronic NOAEL / 5 for species	Sample, et. al,1996
	Beryllium	5.16E-02	5, 100	2-year NOAEL of 25.8 mg/Kg-bw/day for rat divided by 5 for large mammal and by 100 for birds	Morgareidge, et. al., 1977
	Cadmium	1.45E+00	1	90-day NOAEL of 1.45 mg/Kg-bw/day for mallards	White and Finley, 1978
	Chromium VI	2.71E+00	1	5-month NOAEL of 2.71 mg/Kg-bw/day for black ducks	Eisler, 1986
	Cobalt	5.60E+00	3	4-week NOAEL of 16.7 mg/Kg-bw/day for duck / 3 for chronic NOAEL	Van Vleet 1982
	Copper	2.78E+01	3	4-week NOAEL of 83.3 mg/Kg-bw/day for duck / 3 for chronic NOAEL	Van Vleet, 1982
	Lead	2.20E+00	1	12-week NOAEL of 2.2 mg/Kg-bw/day for mallards	Finley, et. al., 1976
	Manganese	7.30E+00	1	7.3 mg/Kg-bw/day required dose for successful reproduction	Offiong and Abed, 1980
	Mercury	7.80E-02	1	12-month NOAEL of 0.078 mg/Kg-bw/day for mallards	Heinz, 1974
	Nickel	1.30E+02	1	90-day NOAEL of 129.5 mg/Kg-bw/day for mallards	Eastin and O'Shea, 1981
	Selenium	1.00E+00	1	11 - 12 week NOAEL of 1 mg/Kg-bw/day for ducks	Heinz, et. al., 1987
	Silver	2.80E+00	1	4-week NOAEL of 8.3 mg/Kg-bw/day for ducks	Van Vleet 1982
	Vanadium	1.30E-01	5	3-week NOAEL of 0.67 mg/Kg-be /day for chickens / 5 for species	Romoser, et. al., 1961
	Zinc	2.04E+01	5	60-day LOAEL of 125 mg/Kg-bw/day for mallards / 5 for NOAEL	Gasaway and Buss, 1972
	Cyanide (total)	1.43E-02	100	LD50 of 1.43 mg/Kg-bw for mallards / 100 for NOAEL	Eisler, 1991
VOCs	Benzene	1.00E-01	5, 100	103-week NOAEL of 50 mg/Kg-bw/day for rodents / 5 for large mammals / 100 for birds	Huff, et. al., 1989
	Carbon disulfide	1.00E-02	5, 5, 100	10-day NOAEL of 25 mg/Kg-bw/day for rabbits / 5 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR, 1996
	Carbon tetrachloride	3.00E-02	5, 100	2-year NOAEL of 15 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	Alumot, et. al., 1976
	Ethylbenzene	1.00E-01	5	90-day NOAEL of 0.53 mg/Kg-bw/day for quail for hexachlorobenzene / 5 for extrapolation across compounds	Vos, et. al., 1971
	Methyl Tert Butyl Ether	1.80E+00	5, 100	90-day NOAEL of 900 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	Robinson, et. al., 1990
	trans-1,2-Dichloroethene	5.62E+00	5, 100	90-day NOAEL of 2809 mg/Kg-bw/day for mice / 5 large mammals / 100 for birds	Hayes, et. al., 1987
	Xylene	1.00E+00	5, 100	103-week NOAEL of 500 mg/Kg-bw/day for rodents / 5 for large mammals / 100 for birds	ATDSR, 1995
SVOCs	2,4,6-Trichlorophenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	2,4-Dichlorophenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	4-Methylphenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	Biphenyl	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	bis(2-chloroethyl)ether	5.00E-02	5, 100	78-week NOAEL of 25 mg/Kg-bw/day for rats / 5 for medium mammals / 100 for birds	Weisburger, et. al., 1981
	bis(2-ethylhexyl)phthalate	1.02E+01	15, 5	4-week LOAEL of 763 mg/Kg-bw/day for chicken / 15 for chronic NOAEL / 5 for species	Wood and Bitman, 1984
	Carbazole	1.00E-02	100, 5, 100	LDLo of 500 mg/Kg-bw for rats / 100 for chronic NOAEL / 5 for large mammals / 100 for birds	Sax, 1984
	Dibenzofuran	1.02E+00	100	LC50 of >102 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
	Di-n-butylphthalate	1.02E+01	3, 5, 5	4-week LOAEL of 763 mg/Kg-bw/day for chickens / 3 for chronic LOAEL / 5 for chronic NOAEL / 5 for TRV	Wood and Bitman, 1984
	Hexachlorobenzene	1.10E-01	5	90-day NOAEL of 0.53 mg/Kg-bw/day for quail for hexachlorobenzene / 5 for extrapolation across compounds	Vos, et. al., 1971
	Hexachlorobutadiene	1.20E+00	5	90-day NOAEL of 6 mg/Kg-bw/day for quail / 5 for species	Schwetz, et. al., 1974
	N-Nitrosodiphenylamine	1.00E-01	5, 100	100-week NOAEL of 50 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	ATSDR, 1991
	Pentachlorophenol	3.80E+00	100	single dose LD50 of 380 mg/Kg-bw for mallards / 100 to estimate chronic NOAEL	Hudson, 1984
PAHs	2-Methylnaphthalene	6.20E+00	5	Naphthalene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Acenaphthene	3.08E+01	1	7-month NOAEL of 30.8 mg/kg-bw for mallards	Patton and Dieter, 1980
	Acenaphthylene	3.08E+01	1	Used TRV for Acenaphthene / 1	Neff 1979; Sims & Overcash, 1983
	Anthracene	2.20E-01	100, 5	LC50 of >111 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL / 5 for species	Schafer, et. al., 1983
	Benzo(a)anthracene	2.00E-04	15, 5, 100	5-week LOAEL of 1.5 mg/Kg-bw/day for mice / 15 for chronic NOAEL / 5 for large mammal / 100 for birds	ATSDR 1993
	Benzo(a)pyrene	1.30E-02	15, 5, 100	9-day LOAEL of 10 mg/Kg-bw/day for mice / 15 for NOAEL / 5 for large mammals / 100 for birds	Mackenzie & Angevine, 1981
	Benzo(b)fluoranthene	8.00E-02	10, 5, 100	chronic carcinogenicity of 40 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 large mammals / 100 for birds	Sims & Overcash, 1983
	Benzo(g,h,i)perylene	3.00E-04	5	Benzo(a)pyrene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Benzo(k)fluoranthene	1.44E-01	10, 5, 100	chronic carcinogenicity of 72 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 large mammals / 100 for birds	Sims & Overcash, 1983
	Chrysene	1.98E-02	10, 5, 100	carcinogenicity of 99 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 for large mammals / 100 for birds	Sims & Overcash, 1983
	Dibenz(a,h)anthracene	3.40E-02	3, 5, 100	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Fluoranthene	2.00E-01	5, 5, 100	13-week NOAEL of 500 mg/Kg-bw/day for mice / 5 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Fluorene	2.00E-01	100, 5	LC50 of >101 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL / 5 for species	Schafer, et. al., 1983
	Naphthalene	1.75E-01	10	7-month NOAEL of 30.8 mg/Kg-bw/day for mallards	Patton and Dieter, 1980
	Phenanthrene	3.08E+01	1	7-month NOAEL of 30.8 mg/kg-bw for mallards	Patton and Dieter, 1980
	Pyrene	3.43E-01	3, 5, 100	10-day NOAEL of 514 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Total PAHs	7.10E-01	1	22-week NOAEL of 0.71 mg/Kg-bw/day for ducks	Stubblefield, et. al., 1995
PCBs	Aroclor-1016	3.00E-02	100	Used TRV for medium mammal / 100	Ringer, et. al., 1981
	Aroclor-1242	1.88E+00	10	12-week LOAEL of 18.75 mg/Kg-bw/day for mallards / 10 for chronic NOAEL	Haseltine and Prouty, 1980
	Aroclor-1248	5.58E+00	100, 5	5-day LC50 for mallards of 2795 mg/Kg-bw / 100 for chronic NOAEL / 5 for species	Heath, et. al., 1972
	Aroclor-1254	1.41E+00	1	1.5-year NOAEL of 1.41 mg/kg-bw for mallards	Heath, et. al., 1972
	Aroclor-1260	1.98E+01	100	5-day LC50 for mallards of 1975 mg/Kg-bw / 100 for chronic NOAEL	Heath, et. al., 1972
	Total PCBs	1.34E-04	10, 100	182-day LOAEL of 0.134 mg/Kg-bw/day for mink / 10 for chronic NOAEL / 100 for birds	Heaton et. al., 1995
Pesticides	4,4'-DDE	1.36E+00	1	1.5-year NOAEL of 1.36 mg/Kg-bw/day for ducks	Heath, et. al., 1972
	4,4'-DDT	2.30E-01	1	343-day NOAEL of 0.23 mg/Kg-bw/day for mallards	Davison and Sell, 1974
	Aldrin	1.00E-02	5	7-week NOAEL of 0.05 mg/Kg-bw/day for pheasants / 5 for species	Hall, et. al., 1971
	Alpha-chlordane	8.60E-01	100, 10	5-day LD50 for mallards of 858 mg/Kg-bw / 100 for chronic NOAEL / 10 for species	Eisler, 1990
	beta-BHC	3.00E+00	10	30-day EMLD of 30 mg/Kg-bw/day for mallard / 10 for chronic NOAEL	Hudson, et. al., 1984
	Dieldrin	2.00E+00	100	5-day LC50 of 200 mg/Kg for mallards / 100 to estimate NOAEL	Heath, et. al., 1972
	Endosulfan I	6.50E-02	100	LD50 of 6.47 mg/Kg for mallards / 100 to estimate NOAEL	Hudson, et. al., 1972
	Endosulfan II	6.50E-02	100	LD50 of 6.47 mg/Kg for mallards / 100 to estimate NOAEL	Hudson, et. al., 1972
	Endrin	1.40E-01	1	6-month NOAEL of 0.14 mg/Kg-bw/day for mallards	Spann, et. al., 1986
	Endrin ketone	1.40E-01	1	Used TRV for Endrin	Spann et al. 1986
	gamma-BHC	1.20E-01	100, 10	96-hour LD50 of 120 mg/Kg-bw for quail / 100 for chronic NOAEL / 10 for species	Dahlen and Haugen 1954
	Gamma-chlordane	8.60E-01	100, 10	5-day LD50 for mallards of 858 mg/Kg-bw / 100 for chronic NOAEL / 10 for species	Eisler, 1990
	Heptachlor	3.60E-01	100, 5	LD50 of 181 mg/kg for American woodcock / 100 to estimate NOAEL / 5 for species	Stickel, et. al., 1956
	Methoxychlor	4.00E+00	500	single dose LC50 for mallards of >2000 mg/Kg-bw / 500 for chronic NOAEL	Hudson, et. al., 1984
	Toxaphene	4.16E-02	10, 10	74-day NOAEL of 4.16 mg/Kg-bw/day for pheasants / 10 for chronic NOAEL / 10 for species	Genelly and Rudd, 1956

UNCERTAINTY FACTORS, RATIONALE AND SOURCES, USED TO CALCULATE TOXICITY REFERENCE VALUES
STAR LAKE CANAL SUPERFUND SITE
JEFFERSON COUNTY, TEXAS

MARSH WREN

	CONSTITUENTS	TRV	UF	RATIONALE	SOURCE
Metals	Aluminum	7.36E+01	10	4-month NOAEL for ringed turtledoves of 73.6 mg/Kg-bw/day/ 10 for intertaxon variability	Carriere et al. 1985
	Antimony	3.50E-03	100	Small Mammal Life Cycle NOAEL of 0.35 mg/Kg-bw/day	Schroeder, et. al. 1968
	Arsenic	7.33E+00	1	6-month NOAEL of 7.33 mg/Kg-bw/day for cowbird	Eisler, 2000
	Barium	1.39E+01	3, 5	4-week NOAEL of 208 mg/Kg-bw/day for chicken / 3 for chronic NOAEL / 5 for species	Sample, et. al,1996
	Beryllium	5.16E-02	5, 100	2-year NOAEL of 25.8 mg/Kg-bw/day for rat divided by 5 for large mammal and by 100 for birds	Morgareidge, et. al., 1977
	Cadmium	4.20E-02	5	Chicken TRV of 0.21 mg/Kg-bw/day	Leach, et. al., 1979
	Chromium VI	2.10E-01	5, 5	5.25 mg/Kg-bw/day LOAEL for chicken / 5 to estimate TRV / 5 for species	Asmatullah, et. al., 1999
	Cobalt	1.10E+00	5	4-week NOAEL of 16.7 mg/Kg-bw/day for duck / 3 for duck TRV / 5 for species	Van Vleet 1982
	Copper	5.00E-01	100	LD50 of 50mg/Kg-bw/day for red-wing blackbird / 100 for chronic NOAEL	Schafer, et. al., 1983
	Lead	9.30E-01	3	11-day NOAEL of 2.8 mg/Kg-bw/day for starling / 3 for TRV	Osborn, et. al., 1983
	Manganese	7.30E+00	1	7.3 mg/Kg-bw/day required dose for successful reproduction	Offiong and Abed, 1980
	Mercury	2.90E-01	3	76-day NOAEL of 0.88 mg/Kg-bw/day for finches / 3 for TRV	Scheuhammer 1988
	Nickel	2.59E+01	5	90-day NOAEL of 129.5 mg/Kg-bw/day for mallards / 5 for species	Eastin and O'Shea, 1981
	Selenium	2.00E-01	5	11 - 12 week NOAEL of 1 mg/Kg-bw/day for ducks / 5 for species	Heinz, et. al., 1987
	Silver	5.50E-01	5	4-week NOAEL of 8.3 mg/Kg-bw/day for ducks / 5 for species	Van Vleet 1982
	Vanadium	1.30E-01	5	3-week NOAEL of 0.67 mg/Kg-be /day for chickens / 5 for species	Romoser, et. al., 1961
	Zinc	2.50E+01	5	12 and 44-week NOAEL of 125 mg/Kg-bw/day for chickens / 5 for species	Stahl, et. al., 1990
	Cyanide (total)	9.00E-02	100	LC50 of 9 mg/Kg-bw/day for starlings / 100 for NOAEL	Wiemeyer, et. al., 1986
VOCs	Benzene	1.00E-01	5, 100	103-week NOAEL of 50 mg/Kg-bw/day for rodents / 5 for large mammals / 100 for birds	Huff, et. al., 1989
	Carbon disulfide	1.00E-02	5, 5, 100	10-day NOAEL of 25 mg/Kg-bw/day for rabbits / 5 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR, 1996
	Carbon tetrachloride	3.00E-02	5, 100	2-year NOAEL of 15 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	Alumot, et. al., 1976
	Ethylbenzene	1.00E-01	5	90-day NOAEL of 0.53 mg/Kg-bw/day for quail for hexachlorobenzene / 5 for extrapolation across compounds	Vos, et. al., 1971
	Methyl Tert Butyl Ether	1.80E-01	5, 100	90-day NOAEL of 900 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	Robinson, et. al., 1990
	trans-1,2-Dichloroethene	5.62E+00	5, 100	90-day NOAEL of 2809 mg/Kg-bw/day for mice / 5 large mammals / 100 for birds	Hayes, et. al., 1987
	Xylene	1.00E+00	5, 100	103-week NOAEL of 500 mg/Kg-bw/day for rodents / 5 for large mammals / 100 for birds	ATDSR, 1995
SVOCs	2,4,6-Trichlorophenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	2,4-Dichlorophenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	4-Methylphenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	Biphenyl	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	bis(2-chloroethyl)ether	5.00E-02	5, 100	78-week NOAEL of 25 mg/Kg-bw/day for rats / 5 for medium mammals / 100 for birds	Weisburger, et. al., 1981
	bis(2-ethylhexyl)phthalate	1.02E+01	15, 5	4-week LOAEL of 763 mg/Kg-bw/day for chicken / 15 for chronic NOAEL / 5 for species	Wood and Bitman, 1984
	Carbazole	1.00E-02	100, 5, 100	LDLo of 500 mg/Kg-bw for rats / 100 for chronic NOAEL / 5 for large mammals / 100 for birds	Sax, 1984
	Dibenzofuran	1.02E+00	100	LC50 of >102 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
	Di-n-butylphthalate	4.45E+00	3, 5	30-day NOAEL of 66.7 mg/Kg-bw/day for starlings / 3 for chronic NOAEL / 5 for species	O'Shea and Stafford, 1980
	Hexachlorobenzene	1.10E-01	5	90-day NOAEL of 0.53 mg/Kg-bw/day for quail for hexachlorobenzene / 5 for extrapolation across compounds	Vos, et. al., 1971
	Hexachlorobutadiene	1.20E+00	5	90-day NOAEL of 6 mg/Kg-bw/day for quail / 5 for species	Schwetz, et. al., 1974
	N-Nitrosodiphenylamine	1.00E-01	5, 100	100-week NOAEL of 50 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	ATSDR, 1991
	Pentachlorophenol	5.50E+00	5	8-week NOAEL of 27.4 mg/Kg-bw/day for chickens / 5 for species	Prescott, et. al., 1982
PAHs	2-Methylnaphthalene	1.20E+00	1	Naphthalene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Acenaphthene	1.01E+00	100	LC50 of >101 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
	Acenaphthylene	2.02E-01	5	Acenaphthene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Anthracene	1.11E+00	100	LC50 of >111 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
	Benzo(a)anthracene	2.00E-04	15, 5, 100	5-week LOAEL of 1.5 mg/Kg-bw/day for mice / 15 for chronic NOAEL / 5 for large mammal / 100 for birds	ATSDR 1993
	Benzo(a)pyrene	1.30E-03	15, 5, 100	9-day LOAEL of 10 mg/Kg-bw/day for mice / 15 for NOAEL / 5 for large mammals / 100 for birds	Mackenzie & Angevine, 1981
	Benzo(b)fluoranthene	8.00E-03	10, 5, 100	chronic carcinogenicity of 40 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 large mammals / 100 for birds	Sims & Overcash, 1983
	Benzo(g,h,i)perylene	3.00E-03	5	Benzo(a)pyrene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Benzo(k)fluoranthene	1.44E-02	10, 5, 100	chronic carcinogenicity of 72 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 large mammals / 100 for birds	Sims & Overcash, 1983
	Chrysene	1.98E-02	10, 5, 100	carcinogenicity of 99 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 for large mammals / 100 for birds	Sims & Overcash, 1983
	Dibenz(a,h)anthracene	3.40E-02	3, 5, 100	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Fluoranthene	2.00E-01	5, 5, 100	13-week NOAEL of 500 mg/Kg-bw/day for mice / 5 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Fluorene	1.01E+00	100	LC50 of >101 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
	Naphthalene	6.20E+00	5	TRV of 30.8 mg/Kg-bw/day for mallards / 5 for species	Patton and Dieter, 1980
	Phenanthrene	1.13E+00	100	LC50 of >113 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
	Pyrene	3.40E-01	3, 5, 100	10-day NOAEL of 514 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Total PAHs	5.45E+01	1	7-month LOAEL of 4000 mg/Kg in mallard / 10 for chronic NOAEL	Eisler 1987
PCBs	Aroclor-1016	3.00E-02	100	247-day NOAEL of 3 mg/Kg-bw/day for mink / 100 for birds	Ringer, et. al., 1981
	Aroclor-1242	2.40E-02	10	6-week NOAEL of 0.24 mg/Kg-bw/day for chickens / 10 for species	Britton and Huston, 1973
	Aroclor-1248	9.00E-02	5	1.5-year NOAEL of 0.45 mg/Kg-bw/day / 5 for species	McLane and Hughes, 1980
	Aroclor-1254	2.40E-03	2000	56-day NOAEL of 24 mg/Kg-bw/day for finches	Presst, et. al., 1970
	Aroclor-1260	4.70E-01	10	18-month NOAEL yielding TRV of 4.7 mg/Kg-bw/day for chickens / 10 for species	Keplinger, et. al., 1971
	Total PCBs	1.34E-04	10, 100	182-day LOAEL of 0.134 mg/Kg-bw/day for mink / 10 for chronic NOAEL / 100 for birds	Heaton et. al., 1995
Pesticides	4,4'-DDE	2.70E-01	5	1.5-year NOAEL of 1.36 mg/Kg-bw/day for ducks / 5 for species	Heath, et. al., 1972
	4,4'-DDT	1.42E+00	10	48 - 115-day NOAEL of 14.2 mg/Kg-bw/day for finches / 10 for chronic NOAEL	Jeffries, 1967
	Aldrin	2.40E-01	100	LD50 of 23.7 mg/Kg-bw for starlings / 100 for chronic NOAEL	Schafer, et. al., 1983
	Alpha-chlordane	5.00E-02	100	14-day LD50 for starlings of 5.33 mg/Kg-bw/day / 100 for chronic NOAEL	Eisler, 1990
	beta-BHC	3.00E+00	10	30-day EMLD of 30 mg/Kg-bw/day for mallard / 10 for chronic NOAEL	Hudson, et. al., 1984
	Dieldrin	5.60E-02	5	2-year NOAEL of 0.28 mg/Kg-bw/day for pigeons / 5 for species	Ahmed, et. al., 1978
	Endosulfan I	1.30E-02	100, 5	LD50 of 6.47 mg/Kg for mallards / 100 to estimate NOAEL / 5 for species	Hudson, et. al., 1972
	Endosulfan II	1.30E-02	100, 5	LD50 of 6.47 mg/Kg for mallards / 100 to estimate NOAEL / 5 for species	Hudson, et. al., 1972
	Endrin	2.00E-02	5	10-week NOAEL of 0.1 mg/Kg-bw/day for pheasant / 5 for species	Genelly and Rudd 1956
	Endrin ketone	2.00E-02	5	10-week NOAEL of 0.1 mg/Kg-bw/day for pheasant / 5 for species	Genelly and Rudd 1956
	gamma-BHC	1.20E-01	100, 10	96-hour LD50 of 120 mg/Kg-bw for quail / 100 for chronic NOAEL / 10 for species	Dahlen and Haugen 1954
	Gamma-chlordane	5.00E-02	100	14-day LD50 for starlings of 5.33 mg/Kg-bw/day / 100 for chronic NOAEL	Eisler, 1990
	Heptachlor	1.81E+00	100	LD50 of 181 mg/kg for American woodcock / 100 to estimate NOAEL	Stickel, et. al., 1956
	Methoxychlor	3.75E+01	100	5-day NOAEL of 3750 mg/Kg-bw/day for robins / 100 for chronic NOAEL	Hunt & Sacho, 1969
	Toxaphene	4.16E-02	10, 10	74-day NOAEL of 4.16 mg/Kg-bw/day for pheasants / 10 for chronic NOAEL / 10 for species	Genelly and Rudd, 1956

UNCERTAINTY FACTORS, RATIONALE AND SOURCES, USED TO CALCULATE TOXICITY REFERENCE VALUES
STAR LAKE CANAL SUPERFUND SITE
JEFFERSON COUNTY, TEXAS

MUSKRAT

	CONSTITUENTS	TRV	UF	RATIONALE	SOURCE
Metals	Aluminum	6.00E+01	1	6-month NOAEL of 60 mg/Kg-bw/day for dogs	ATSDR, 1990
	Antimony	8.40E-01	10, 10	32-day NOAEL of 84 mg/Kg-bw/day for dogs / 10 uncertainty / 10 chronic NOAEL	ATSDR, 1990
	Arsenic	2.35E+00	1	2-year NOAEL of 2.35 mg/Kg-bw/day for dogs	Byron, et. al., 1967
	Barium	6.00E+00	3, 5	LD50 of 90 mg/Kg-bw for dogs / 3 for chronic LOAEL / 5 for NOAEL	Sax,1984
	Beryllium	5.16E+00	5	2-year NOAEL of 25.8 mg/Kg-bw/day for rat / 5 for medium mammal	Morgareidge, et. al., 1977
	Cadmium	4.90E-01	1	4-year NOAEL of 0.49 mg/Kg-bw/day for dogs	Anwar, et. al., 1961
	Chromium VI	2.40E-01	1	4-year NOAEL of 0.24 mg/Kg-bw/day for dogs	Anwar, et. al., 1961
	Cobalt	1.67E+00	3	4-week NOAEL of 5 mg/Kg-bw/day for dogs / 3 for chronic NOAEL	Brewer, 1940
	Copper	2.85E+00	1	357-day NOAEL of 2.85 mg/Kg-bw/day for mink	Aulerich, et. al., 1982
	Lead	2.70E+00	1	2-year NOAEL of 50 mg/Kg-bw/day for dogs	ATSDR, 1997
	Manganese	8.80E+00	5	Used TRV value for small mammals / 5 for medium mammals	Laskey et al. 1982
	Mercury	7.60E-02	1	93-day NOAEL of 0.076 mg/Kg-bw/day for mink	Wobeser, et. al., 1975
	Nickel	5.42E+01	1	2-year NOAEL of 54.2 mg/Kg-bw/day for dogs	Ambrose, et. al., 1976
	Selenium	2.00E-02	5, 5	3 generation LOAEL of 0.45 for mice / 5 for chronic NOAEL / 5 for medium mammals	Schroeder & Mitchener, 1971
	Silver	8.90E+00	5, 5	37-week LOAEL of 222.2 mg/Kg-bw/day for rats / 5 for NOAEL / 5 for medium mammals	ATSDR, 1990
	Vanadium	4.20E-01	5	60-day NOAEL of 2.1 mg/Kg-bw/day for rats / 5 for medium mammals	Domingo, et. al., 1986
	Zinc	2.08E+01	1	25-week NOAEL of 20.8 mg/Kg-bw/day for mink	Bleavins, et. al., 1983
	Cyanide (total)	1.06E+00	1	15-month NOAEL of 1.06 mg/Kg-bw/day for dogs	Eisler, 1991
VOCs	Benzene	1.00E+01	5	103-week NOAEL of 50 mg/Kg-bw/day for rodents / 5 for large mammals	Huff, et. al., 1989
	Carbon disulfide	1.00E+00	5, 5	10-day NOAEL of 25 mg/Kg-bw/day for rabbits / 5 for chronic NOAEL / 5 for medium mammals	ATSDR, 1996
	Carbon tetrachloride	3.00E+00	5	2-year NOAEL of 15 mg/Kg-bw/day for rats / 5 for medium mammals	Alumot, et. al., 1976
	Ethylbenzene	1.90E+00	500, 5	LD50 of 4769 mg/Kg-bw for rats / 500 for chronic NOAEL / 5 for small mammals	ATDSR, 1999
	Methyl Tert Butyl Ether	1.80E+02	5	90-day NOAEL of 900 mg/Kg-bw/day for rats / 5 for medium mammals	Robinson, et. al., 1990
	trans-1,2-Dichloroethene	5.62E+02	5	90-day NOAEL of 2809 mg/Kg-bw/day for mice / 5 large mammals	Hayes, et. al., 1987
	Xylene	1.00E+02	5	103-week NOAEL of 500 mg/Kg-bw/day for rodents / 5 for medium mammals	ATDSR, 1995
SVOCs	2,4,6-Trichlorophenol	1.20E-01	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	ATDSR, 1994
	2,4-Dichlorophenol	1.20E-01	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	ATDSR, 1994
	4-Methylphenol	1.20E-01	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	ATDSR, 1994
	Biphenyl	1.20E-01	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	ATDSR, 1994
	bis(2-chloroethyl)ether	5.00E+00	5	78-week NOAEL of 25 mg/Kg-bw/day for rats / 5 for medium mammals	Weisburger, et. al., 1981
	bis(2-ethylhexyl)phthalate	6.00E+01	1	1-year NOAEL of 60 mg/Kg-bw/day for dogs	Carpenter, et. al., 1953
	Carbazole	1.00E+00	100, 5	LDLo of 500 mg/Kg-bw for rats / 100 for chronic NOAEL / 5 for medium mammals	Sax, 1984
	Dibenzofuran	2.40E-01	5, 5, 5	103-week LOAEL of 30 mg/Kg-bw for rodents / 5 for chronic NOAEL / 5 for compound extrapolation / 5 species	ATDSR, 1990
	Di-n-butylphthalate	7.90E+01	5	105-day NOAEL of 395 mg/Kg-bw/day for mice / 5 for species	Lamb, et. al., 1987
	Hexachlorobenzene	1.20E-01	1	331-day NOAEL of 0.12 mg/Kg-bw/day for mink	Bleavins, et. al., 1984
	Hexachlorobutadiene	4.00E-02	5	2-year and 5-month NOAELs of 0.2 mg/Kg-bw/day for rats / 5 for medium mammals	Schwetz, et. al., 1974
	N-Nitrosodiphenylamine	1.00E+01	5	100-week NOAEL of 50 mg/Kg-bw/day for rats / 5 for medium mammals	ATSDR, 1991
	Pentachlorophenol	6.00E-01	5	62-day NOAEL of 3 mg/Kg-bw/day for rats / 5 for medium mammals	ATDSR, 1994
PAHs	2-Methylnaphthalene	3.50E+00	5	Naphthalene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Acenaphthene	3.40E+00	3, 5	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for medium mammals	ATSDR, 1993
	Acenaphthylene	6.80E-01	5	Acenaphthene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Anthracene	4.00E+01	5, 5	13-week NOAEL of 1000 mg/Kg-bw/day for mice / 5 for chronic NOAEL / 5 for medium mammals	ATSDR, 1995
	Benzo(a)anthracene	2.00E-02	15, 5	5-week LOAEL of 1.5 mg/Kg-bw/day for mice / 15 for chronic NOAEL / 5 for medium mammals	ATSDR 1993
	Benzo(a)pyrene	1.30E-01	15, 5	9-day LOAEL of 10 mg/Kg-bw/day for mice / 15 for NOAEL / 5 for medium mammals	Mackenzie & Angevine, 1981
	Benzo(b)fluoranthene	8.00E-01	10, 5	chronic carcinogenicity of 40 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 medium mammals	Sims & Overcash, 1983
	Benzo(g,h,i)perylene	3.00E-02	5	Benzo(a)pyrene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Benzo(k)fluoranthene	1.44E+00	10, 5	chronic carcinogenicity of 72 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 large mammals	Sims & Overcash, 1983
	Chrysene	1.98E+00	10, 5	carcinogenicity of 99 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 medium mammals	Sims & Overcash, 1983
	Dibenz(a,h)anthracene	3.40E+00	3, 5	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 medium mammals	ATSDR 1995
	Fluoranthene	2.00E+01	5, 5	13-week NOAEL of 500 mg/kg-bw/day for mice / 5 for chronic NOAEL / 5 for medium mammals	ATSDR 1995
	Fluorene	2.00E+01	5, 5	13-week NOAEL of 500 mg/Kg-bw/day for mice / 5 for chronic NOAEL / 5 for medium mammals	ATSDR, 1995
	Naphthalene	1.75E+01	15	7-day LOAEL of 263 mg/Kg-bw/day for dogs / 15 for NOAEL	Zuelzer and Apt, 1949
	Phenanthrene	3.42E+01	3, 5	10-day NOAEL of 514 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for medium mammals	ATSDR, 1995
	Pyrene	3.43E+01	3, 5	10-day NOAEL of 514 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for medium mammals	ATSDR 1995
	Total PAHs	7.10E-03	100	22-week NOAEL of 0.71 mg/Kg-bw/day for ducks / 100 for small mammals	Stubblefield, et. al., 1995
PCBs	Aroclor-1016	3.00E+00	1	247-day NOAEL of 3 mg/Kg-bw/day for mink	Ringer, et. al., 1981
	Aroclor-1242	9.40E-02	10	247-day LOAEL of 0.94 mg/Kg-bw/day for mink / 10 for chronic NOAEL	Beavins, et. al., 1980
	Aroclor-1248	5.20E-01	5, 5	5-week LOAEL of 13 mg/Kg-bw/day for mice / 5 for chronic NOAEL / 5 for species	ATDSR, 1991
	Aroclor-1254	7.30E-02	1	250-day NOAEL of 0.073 mg/Kg-bw/day for mink	Hornshaw, et. al., 1971
	Aroclor-1260	1.50E-01	1	4-month NOAEL of 0.15 mg/Kg-bw/day for mink	Aulerich, et. al., 1977
	Total PCBs	1.34E-04	10	182-day LOAEL of 0.134 mg/Kg-bw/day for mink / 10 for chronic NOAEL	Heaton et. al., 1995
Pesticides	4,4'-DDE	8.40E-01	1	66-day NOAEL of 0.84 mg/Kg-bw/day for mink	Jensen, et. al., 1977
	4,4'-DDT	8.40E-01	1	66-day NOAEL of 0.84 mg/Kg-bw/day for mink	Jensen, et. al., 1977
	Aldrin	2.00E-01	1	Medium mammal TRV	Fitzhugh et al. 1964
	Alpha-chlordane	1.40E-01	1	2-year NOAEL of 0.14 mg/Kg-bw/day for dogs	Eisler, 1990
	beta-BHC	5.60E-01	5	13-week NOAEL of 2.8 mg/Kg-bw/day for rats / 5 for medium mammals	Van Velson, et. al., 1986
	Dieldrin	2.00E-01	1	2-year NOAEL of 0.2 mg/Kg-bw/day for dogs	Fitzhugh, et. al., 1964
	Endosulfan I	5.20E-03	5	78-week LOAEL of 0.26 mg/Kg-bw/day for mice / 5 for medium mammals	ATSDR, 1990
	Endosulfan II	5.20E-03	5	78-week LOAEL of 0.26 mg/Kg-bw/day for mice / 5 for medium mammals	ATSDR, 1990
	Endrin	1.70E-01	5	14-day LC50 of 87 mg/Kg-bw/day for short tail shrews / 5 for medium mammals	Blus, 1978
	Endrin ketone	1.70E-01	5	14-day LC50 of 87 mg/Kg-bw/day for short tail shrews / 5 for medium mammals	Blus, 1978
	gamma-BHC	2.92E+00	1	104-week NOAEL of 2.92 mg/Kg-bw/day for dogs	Rivett, et. al., 1978
	Gamma-chlordane	1.40E-01	1	2-year NOAEL of 0.14 mg/Kg-bw/day for dogs	Eisler, 1990
	Heptachlor	5.70E-01	10	30-day NOAEL of 5.67 mg/Kg-bw/day for mink / 10 for chronic NOAEL	Stickel, et. al., 1956
	Methoxychlor	3.50E+01	1	24-week NOAEL of 35 mg/Kg-bw/day for dogs	Tegeris, et. al., 1966
	Toxaphene	4.16E-03	100	74-day NOAEL of 4.16 mg/Kg-bw/day for pheasants / 100 for species	Genelly and Rudd, 1956

UNCERTAINTY FACTORS, RATIONALE AND SOURCES, USED TO CALCULATE TOXICITY REFERENCE VALUES
STAR LAKE CANAL SUPERFUND SITE
JEFFERSON COUNTY, TEXAS

PAINTED TURTLE

	CONSTITUENTS	TRV	UF	RATIONALE	SOURCE
Metals	Aluminum	6.00E-01	100	6-month NOAEL of 60 mg/Kg-bw/day for dogs / 100 for species	ATSDR, 1990
	Antimony	3.50E-03	100	life cycle NOAEL of 0.35 mg/Kg-bw/day for mice / 10 uncertainty / 10 chronic NOAEL	Schroeder, et. al., 1968
	Arsenic	2.35E-02	100	2-year NOAEL of 2.35 mg/Kg-bw/day for dogs / 100 for species	Byron, et. al., 1967
	Barium	6.00E-02	3, 5, 100	LD50 of 90 mg/Kg-bw for dogs / 3 for chronic LOAEL / 5 for NOAEL / 100 for species	Sax,1984
	Beryllium	5.16E-02	5, 100	2-year NOAEL of 25.8 mg/Kg-bw/day for rat / 5 for medium mammal / 100 for species	Morgareidge, et. al., 1977
	Cadmium	4.00E-03	1, 100	4-year NOAEL of 0.49 mg/Kg-bw/day for dogs / 100 for species	Anwar, et. al., 1961
	Chromium VI	2.40E-03	100	4-year NOAEL of 0.24 mg/Kg-bw/day for dogs / 100 for species	Anwar, et. al., 1961
	Cobalt	1.67E-02	3, 100	4-week NOAEL of 5 mg/Kg-bw/day for dogs / 3 for chronic NOAEL / 100 for species	Brewer, 1940
	Copper	2.85E-02	100	357-day NOAEL of 2.85 mg/Kg-bw/day for mink / 100 for species	Aulerich, et. al., 1982
	Lead	3.98E-02	100	2-year NOAEL of 50 mg/Kg-bw/day for dogs / 100 for species	ATSDR, 1997
	Manganese	1.06E-01	100	35-day NOAEL of 10.6 mg/Kg-bw/day for calves / 100 for species	Jenkins and Hidiroglou, 1991
	Mercury	7.60E-04	100	93-day NOAEL of 0.076 mg/Kg-bw/day for mink / 100 for species	Wobeser, et. al., 1975
	Nickel	5.42E-01	100	2-year NOAEL of 54.2 mg/Kg-bw/day for dogs / 100 for species	Ambrose, et. al., 1976
	Selenium	2.00E-04	5, 5, 100	3 generation LOAEL of 0.45 for mice / 5 for chronic NOAEL / 5 for medium mammals / 100 for species	Schroeder & Mitchener, 1971
	Silver	8.90E-02	5, 5, 100	37-week LOAEL of 222.2 mg/Kg-bw/day for rats / 5 for NOAEL / 5 for medium mammals / 100 for species	ATSDR, 1990
	Vanadium	4.20E-03	5, 100	60-day NOAEL of 2.1 mg/Kg-bw/day for rats / 5 for medium mammals / 100 for species	Domingo, et. al., 1986
	Zinc	2.08E-01	100	25-week NOAEL of 20.8 mg/Kg-bw/day for mink / 100 for species	Bleavins, et. al., 1983
	Cyanide (total)	7.00E-03	1	15-month NOAEL of 1.06 mg/Kg-bw/day for dogs	Eisler, 1991
VOCs	Benzene	1.00E-01	5, 100	103-week NOAEL of 50 mg/Kg-bw/day for rodents / 5 for large mammals / 100 for reptiles	Huff, et. al., 1989
	Carbon disulfide	1.00E-02	5, 5, 100	10-day NOAEL of 25 mg/Kg-bw/day for rabbits / 5 for chronic NOAEL / 5 for medium mammals / 100 for reptiles	ATSDR, 1996
	Carbon tetrachloride	3.00E-02	5, 100	2-year NOAEL of 15 mg/Kg-bw/day for rats / 5 for medium mammals / 100 for reptiles	Alumot, et. al., 1976
	Ethylbenzene	1.90E-02	5, 100	LD50 of 4769 mg/Kg-bw for rats / 500 for chronic NOAEL / 5 for small mammals / 100 for reptiles	ATDSR, 1999
	Methyl Tert Butyl Ether	1.80E+00	5, 100	90-day NOAEL of 900 mg/Kg-bw/day for rats / 5 for medium mammals / 100 for reptiles	Robinson, et. al., 1990
	trans-1,2-Dichloroethene	5.62E+00	5, 100	90-day NOAEL of 2809 mg/Kg-bw/day for mice / 5 large mammals / 100 for reptiles	Hayes, et. al., 1987
	Xylene	1.00E+00	5, 100	103-week NOAEL of 500 mg/Kg-bw/day for rodents / 5 for medium mammals / 100 for reptiles	ATDSR, 1995
SVOCs	2,4,6-Trichlorophenol	6.00E-03	5, 100	Pentachlorophenol TRV / 5 for extrapolation across compounds / 100 for reptiles	ATDSR, 1994
	2,4-Dichlorophenol	6.00E-03	5, 100	Pentachlorophenol TRV / 5 for extrapolation across compounds / 100 for reptiles	ATDSR, 1994
	4-Methylphenol	6.00E-03	5, 100	Pentachlorophenol TRV / 5 for extrapolation across compounds / 100 for reptiles	ATDSR, 1994
	Biphenyl	6.00E-03	5, 100	Pentachlorophenol TRV / 5 for extrapolation across compounds / 100 for reptiles	ATDSR, 1994
	bis(2-chloroethyl)ether	5.00E-02	5	78-week NOAEL of 25 mg/Kg-bw/day for rats / 5 for medium mammals	Weisburger, et. al., 1981
	bis(2-ethylhexyl)phthalate	1.20E-01	1	1-year NOAEL of 60 mg/Kg-bw/day for dogs	Carpenter, et. al., 1953
	Carbazole	1.00E-02	100, 5, 100	LDLo of 500 mg/Kg-bw for rats / 100 for chronic NOAEL / 5 for medium mammals / 100 for reptiles	Sax, 1984
	Dibenzofuran	2.40E-03	5, 5, 5, 100	103-week LOAEL of 30 mg/Kg-bw for rodents / 5 for chronic NOAEL / 5 for compound extrapolation / 5 species / 100 for reptiles	ATDSR, 1990
	Di-n-butylphthalate	7.90E-01	5, 100	105-day NOAEL of 395 mg/Kg-bw/day for mice / 5 for species / 100 for reptiles	Lamb, et. al., 1987
	Hexachlorobenzene	1.20E-03	100	331-day NOAEL of 0.12 mg/Kg-bw/day for mink / 100 for reptiles	Bleavins, et. al., 1984
	Hexachlorobutadiene	4.00E-04	5, 100	2-year and 5-month NOAELs of 0.2 mg/Kg-bw/day for rats / 5 for medium mammals / 100 for reptiles	Schwetz, et. al., 1974
	N-Nitrosodiphenylamine	1.00E-01	5, 100	100-week NOAEL of 50 mg/Kg-bw/day for rats / 5 for medium mammals / 100 for reptiles	ATSDR, 1991
	Pentachlorophenol	1.00E-02	5, 100	62-day NOAEL of 3 mg/Kg-bw/day for rats / 5 for medium mammals / 100 for reptiles	ATDSR, 1994
PAHs	2-Methylnaphthalene	3.50E-02	5	Naphthalene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Acenaphthene	3.40E-02	3, 5, 100	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for medium mammals / for reptiles	ATSDR, 1993
	Acenaphthylene	6.80E-03	5	Acenaphthene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Anthracene	4.00E-01	5, 5, 100	13-week NOAEL of 1000 mg/Kg-bw/day for mice / 5 for chronic NOAEL / 5 for medium mammals / 100 for reptiles	ATSDR, 1995
	Benzo(a)anthracene	2.00E-04	15, 5, 100	5-week LOAEL of 1.5 mg/Kg-bw/day for mice / 15 for chronic NOAEL / 5 for medium mammals / 100 for reptiles	ATSDR 1993
	Benzo(a)pyrene	1.30E-03	15, 5, 100	9-day LOAEL of 10 mg/Kg-bw/day for mice / 15 for NOAEL / 5 for medium mammals / 100 for reptiles	Mackenzie & Angevine, 1981
	Benzo(b)fluoranthene	8.00E-03	10, 5, 100	chronic carcinogenicity of 40 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 medium mammals / 100 for reptiles	Sims & Overcash, 1983
	Benzo(g,h,i)perylene	3.00E-04	5	Benzo(a)pyrene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Benzo(k)fluoranthene	1.44E-02	10, 5, 100	chronic carcinogenicity of 72 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 large mammals / 100 for reptiles	Sims & Overcash, 1983
	Chrysene	1.98E-02	10, 5, 100	carcinogenicity of 99 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 medium mammals / 100 for reptiles	Sims & Overcash, 1983
	Dibenz(a,h)anthracene	3.40E-02	3, 5, 100	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 medium mammals / 100 for reptiles	ATSDR 1995
	Fluoranthene	2.00E-01	5, 5, 100	13-week NOAEL of 500 mg/kg-bw/day for mice / 5 for chronic NOAEL / 5 for medium mammals / 100 for reptiles	ATSDR 1995
	Fluorene	2.00E-01	5, 5, 100	13-week NOAEL of 500 mg/kg-bw/day for mice / 5 for chronic NOAEL / 5 for medium mammals / 100 for reptiles	ATSDR, 1995
	Naphthalene	1.75E-01	15, 100	7-day LOAEL of 263 mg/Kg-bw/day for dogs / 15 for NOAEL / 100 for reptiles	Zuelzer and Apt, 1949
	Phenanthrene	3.42E-01	3, 5, 100	10-day NOAEL of 514 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for medium mammals / 100 for reptiles	ATSDR, 1995
	Pyrene	3.43E-01	3, 5, 100	10-day NOAEL of 514 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for medium mammals / 100 for reptiles	ATSDR 1995
	Total PAHs	7.10E-03	100	22-week NOAEL of 0.71 mg/Kg-bw/day for ducks / 100 for reptiles	Stubblefield, et. al., 1995
PCBs	Aroclor-1016	1.00E-01	100	247-day NOAEL of 3 mg/Kg-bw/day for mink / 100 for reptiles	Ringer, et. al., 1981
	Aroclor-1242	9.00E-04	10, 100	247-day LOAEL of 0.94 mg/Kg-bw/day for mink / 10 for chronic NOAEL / 100 for reptiles	Beavins, et. al., 1980
	Aroclor-1248	5.20E-03	5, 5, 100	5-week LOAEL of 13 mg/Kg-bw/day for mice / 5 for chronic NOAEL / 5 for species / 100 for reptiles	ATDSR, 1991
	Aroclor-1254	7.30E-04	100	250-day NOAEL of 0.073 mg/Kg-bw/day for mink / 100 for reptiles	Hornshaw, et. al., 1971
	Aroclor-1260	1.50E-03	100	4-month NOAEL of 0.15 mg/Kg-bw/day for mink / 100 for reptiles	Aulerich, et. al., 1977
	Total PCBs	1.34E-04	10, 100	182-day LOAEL of 0.134 mg/Kg-bw/day for mink / 10 for chronic NOAEL / 100 for reptiles	Heaton et. al., 1995
Pesticides	4,4'-DDE	8.40E-03	100	66-day NOAEL of 0.84 mg/Kg-bw/day for mink / 100 for species	Jensen, et. al., 1977
	4,4'-DDT	1.17E-02	1	66-day NOAEL of 0.84 mg/Kg-bw/day for mink	Jensen, et. al., 1977
	Aldrin	4.00E-04	5, 100	2-year NOAEL of 0.2 mg/Kg-bw/day for dogs / 5 for species / 100 for species	Fitzhugh, et. al., 1964
	Alpha-chlordane	1.40E-03	100	2-year NOAEL of 0.14 mg/Kg-bw/day for dogs / 100 for species	Eisler, 1990
	beta-BHC	2.80E-02	100	13 week NOAEL of 2.8 mg/Kg-bw/day for rate / 100 for amphibians	Velson et al. 1986
	Dieldrin	1.37E-03	100	2-year NOAEL of 0.2 mg/Kg-bw/day for dogs / 100 for species	Fitzhugh, et. al., 1964
	Endosulfan I	5.20E-05	5, 100	78-week LOAEL of 0.26 mg/Kg-bw/day for mice / 5 for medium mammals / 100 for species	ATSDR, 1990
	Endosulfan II	2.60E-04	5, 100	78-week LOAEL of 0.26 mg/Kg-bw/day for mice / 5 for medium mammals / 100 for species	ATSDR, 1990
	Endrin	1.70E-03	5, 100	14-day LC50 of 87 mg/Kg-bw/day for short tail shrews / 5 for medium mammals / 100 for species	Blus, 1978
	Endrin ketone	1.00E+04	100	Endrin TRV for small mammals / 100 for species	Blus, 1978
	gamma-BHC	1.00E-01	1	104-week NOAEL of 2.92 mg/Kg-bw/day for dogs	Rivett, et. al., 1978
	Gamma-chlordane	1.40E-03	100	2-year NOAEL of 0.14 mg/Kg-bw/day for dogs / 100 for species	Eisler, 1990
	Heptachlor	2.00E-03	10, 100	30-day NOAEL of 5.67 mg/Kg-bw/day for mink / 10 for chronic NOAEL / 100 for species	Stickel, et. al., 1956
	Methoxychlor	1.00E-01	100	11-week NOAEL of 25 mg/Kg-bw/day for rats / 100 for species	Gray, et. al., 1989
	Toxaphene	4.16E-03	10, 100	74-day NOAEL of 4.16 mg/Kg-bw/day for pheasants / 10 for chronic NOAEL / 100 for species	Genelly and Rudd, 1956

UNCERTAINTY FACTORS, RATIONALE AND SOURCES, USED TO CALCULATE TOXICITY REFERENCE VALUES
STAR LAKE CANAL SUPERFUND SITE
JEFFERSON COUNTY, TEXAS

RACCOON

	CONSTITUENTS	TRV	UF	RATIONALE	SOURCE
Metals	Aluminum	6.00E+01	1	6-month NOAEL of 60 mg/Kg-bw/day for dogs	ATSDR, 1990
	Antimony	3.50E-02	10, 10	32-day NOAEL of 84 mg/Kg-bw/day for dogs / 10 uncertainty / 10 chronic NOAEL	ATSDR, 1990
	Arsenic	2.35E+00	1	2-year NOAEL of 2.35 mg/Kg-bw/day for dogs	Byron, et. al., 1967
	Barium	6.00E+00	3, 5	LD50 of 90 mg/Kg-bw for dogs / 3 for chronic LOAEL / 5 for NOAEL	Sax,1984
	Beryllium	5.16E+00	5	2-year NOAEL of 25.8 mg/Kg-bw/day for rat / 5 for medium mammal	Morgareidge, et. al., 1977
	Cadmium	4.90E-01	1	4-year NOAEL of 0.49 mg/Kg-bw/day for dogs	Anwar, et. al., 1961
	Chromium VI	2.40E-01	1	4-year NOAEL of 0.24 mg/Kg-bw/day for dogs	Anwar, et. al., 1961
	Cobalt	1.67E+00	3	4-week NOAEL of 5 mg/Kg-bw/day for dogs / 3 for chronic NOAEL	Brewer, 1940
	Copper	2.85E+00	1	357-day NOAEL of 2.85 mg/Kg-bw/day for mink	Aulerich, et. al., 1982
	Lead	2.70E+00	1	2-year NOAEL of 50 mg/Kg-bw/day for dogs	ATSDR, 1997
	Manganese	8.80E+00	5	Used small mammal TRV / 5	Laskey et al. 1982
	Mercury	7.60E-02	1	93-day NOAEL of 0.076 mg/Kg-bw/day for mink	Wobeser, et. al., 1975
	Nickel	5.42E+01	1	2-year NOAEL of 54.2 mg/Kg-bw/day for dogs	Ambrose, et. al., 1976
	Selenium	2.00E-02	5, 5	3 generation LOAEL of 0.45 for mice / 5 for chronic NOAEL / 5 for medium mammals	Schroeder & Mitchener, 1971
	Silver	8.90E+00	5, 5	37-week LOAEL of 222.2 mg/Kg-bw/day for rats / 5 for NOAEL / 5 for medium mammals	ATSDR, 1990
	Vanadium	4.20E-01	5	60-day NOAEL of 2.1 mg/Kg-bw/day for rats / 5 for medium mammals	Domingo, et. al., 1986
	Zinc	2.08E+01	1	25-week NOAEL of 20.8 mg/Kg-bw/day for mink	Bleavins, et. al., 1983
	Cyanide (total)	1.06E+00	1	15-month NOAEL of 1.06 mg/Kg-bw/day for dogs	Eisler, 1991
VOCs	Benzene	1.00E+01	5	103-week NOAEL of 50 mg/Kg-bw/day for rodents / 5 for large mammals	Huff, et. al., 1989
	Carbon disulfide	1.00E+00	5, 5	10-day NOAEL of 25 mg/Kg-bw/day for rabbits / 5 for chronic NOAEL / 5 for medium mammals	ATSDR, 1996
	Carbon tetrachloride	3.00E+00	5	2-year NOAEL of 15 mg/Kg-bw/day for rats / 5 for medium mammals	Alumot, et. al., 1976
	Ethylbenzene	1.90E+00	500, 5	LD50 of 4769 mg/Kg-bw for rats / 500 for chronic NOAEL / 5 for small mammals	ATDSR, 1999
	Methyl Tert Butyl Ether	1.80E+02	5	90-day NOAEL of 900 mg/Kg-bw/day for rats / 5 for medium mammals	Robinson, et. al., 1990
	trans-1,2-Dichloroethene	5.62E+02	5	90-day NOAEL of 2809 mg/Kg-bw/day for mice / 5 large mammals	Hayes, et. al., 1987
	Xylene	1.00E+02	5	103-week NOAEL of 500 mg/Kg-bw/day for rodents / 5 for medium mammals	ATDSR, 1995
SVOCs	2,4,6-Trichlorophenol	1.20E-01	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	ATDSR, 1994
	2,4-Dichlorophenol	1.20E-01	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	ATDSR, 1994
	4-Methylphenol	1.20E-01	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	ATDSR, 1994
	Biphenyl	1.20E-01	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	ATDSR, 1994
	bis(2-chloroethyl)ether	5.00E+00	5	78-week NOAEL of 25 mg/Kg-bw/day for rats / 5 for medium mammals	Weisburger, et. al., 1981
	bis(2-ethylhexyl)phthalate	6.00E+01	1	1-year NOAEL of 60 mg/Kg-bw/day for dogs	Carpenter, et. al., 1953
	Carbazole	1.00E+00	100, 5	LDLo of 500 mg/Kg-bw for rats / 100 for chronic NOAEL / 5 for medium mammals	Sax, 1984
	Dibenzofuran	2.40E-01	5, 5, 5	103-week LOAEL of 30 mg/Kg-bw for rodents / 5 for chronic NOAEL / 5 for compound extrapolation / 5 species	ATDSR, 1990
	Di-n-butylphthalate	7.90E+01	5	105-day NOAEL of 395 mg/Kg-bw/day for mice / 5 for species	Lamb, et. al., 1987
	Hexachlorobenzene	1.20E-01	1	331-day NOAEL of 0.12 mg/Kg-bw/day for mink	Bleavins, et. al., 1984
	Hexachlorobutadiene	4.00E-02	5	2-year and 5-month NOAELs of 0.2 mg/Kg-bw/day for rats / 5 for medium mammals	Schwetz, et. al., 1974
	N-Nitrosodiphenylamine	1.00E+01	5	100-week NOAEL of 50 mg/Kg-bw/day for rats / 5 for medium mammals	ATSDR, 1991
	Pentachlorophenol	6.00E-01	5	62-day NOAEL of 3 mg/Kg-bw/day for rats / 5 for medium mammals	ATDSR, 1994
PAHs	2-Methylnaphthalene	3.50E+00	5	Naphthalene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Acenaphthene	3.40E+00	3, 5	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for medium mammals	ATSDR, 1993
	Acenaphthylene	6.80E-01	5	Acenaphthene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Anthracene	4.00E+01	5, 5	13-week NOAEL of 1000 mg/Kg-bw/day for mice / 5 for chronic NOAEL / 5 for medium mammals	ATSDR, 1995
	Benzo(a)anthracene	2.00E-02	15, 5	5-week LOAEL of 1.5 mg/Kg-bw/day for mice / 15 for chronic NOAEL / 5 for medium mammals	ATSDR 1993
	Benzo(a)pyrene	1.30E-01	15, 5	9-day LOAEL of 10 mg/Kg-bw/day for mice / 15 for NOAEL / 5 for medium mammals	Mackenzie & Angevine, 1981
	Benzo(b)fluoranthene	8.00E-01	10, 5	chronic carcinogenicity of 40 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 medium mammals	Sims & Overcash, 1983
	Benzo(g,h,i)perylene	3.00E-02	5	Benzo(a)pyrene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Benzo(k)fluoranthene	1.44E+00	10, 5	chronic carcinogenicity of 72 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 large mammals	Sims & Overcash, 1983
	Chrysene	1.98E+00	10, 5	carcinogenicity of 99 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 medium mammals	Sims & Overcash, 1983
	Dibenz(a,h)anthracene	3.40E+00	3, 5	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 medium mammals	ATSDR 1995
	Fluoranthene	2.00E+01	5, 5	13-week NOAEL of 500 mg/kg-bw/day for mice / 5 for chronic NOAEL / 5 for medium mammals	ATSDR 1995
	Fluorene	2.00E+01	5, 5	13-week NOAEL of 500 mg/Kg-bw/day for mice / 5 for chronic NOAEL / 5 for medium mammals	ATSDR, 1995
	Naphthalene	1.75E+01	15	7-day LOAEL of 263 mg/Kg-bw/day for dogs / 15 for NOAEL	Zuelzer and Apt, 1949
	Phenanthrene	3.42E+01	3, 5	10-day NOAEL of 514 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for medium mammals	ATSDR, 1995
	Pyrene	3.43E+01	3, 5	10-day NOAEL of 514 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for medium mammals	ATSDR 1995
	Total PAHs	7.10E-03	100	22-week NOAEL of 0.71 mg/Kg-bw/day for ducks / 100 for small mammals	Stubblefield, et. al., 1995
PCBs	Aroclor-1016	3.00E+00	1	247-day NOAEL of 3 mg/Kg-bw/day for mink	Ringer, et. al., 1981
	Aroclor-1242	9.40E-02	10	247-day LOAEL of 0.94 mg/Kg-bw/day for mink / 10 for chronic NOAEL	Beavins, et. al., 1980
	Aroclor-1248	5.20E-02	5, 5	5-week LOAEL of 13 mg/Kg-bw/day for mice / 5 for chronic NOAEL / 5 for species	ATDSR, 1991
	Aroclor-1254	7.30E-02	1	250-day NOAEL of 0.073 mg/Kg-bw/day for mink	Hornshaw, et. al., 1971
	Aroclor-1260	1.50E-02	1	4-month NOAEL of 0.15 mg/Kg-bw/day for mink	Aulerich, et. al., 1977
	Total PCBs	1.34E-04	10	182-day LOAEL of 0.134 mg/Kg-bw/day for mink / 10 for chronic NOAEL	Heaton et. al., 1995
Pesticides	4,4'-DDE	8.40E-01	1	66-day NOAEL of 0.84 mg/Kg-bw/day for mink	Jensen, et. al., 1977
	4,4'-DDT	8.40E-01	1	66-day NOAEL of 0.84 mg/Kg-bw/day for mink	Jensen, et. al., 1977
	Aldrin	2.00E-01	5	2-year NOAEL of 0.2 mg/Kg-bw/day for dogs / 5 for species	Fitzhugh, et. al., 1964
	Alpha-chlordane	1.40E-01	1	2-year NOAEL of 0.14 mg/Kg-bw/day for dogs	Eisler, 1990
	beta-BHC	5.60E-01	5	13-week NOAEL of 2.8 mg/Kg-bw/day for rats / 5 for medium mammals	Van Velson, et. al., 1986
	Dieldrin	2.00E-01	1	2-year NOAEL of 0.2 mg/Kg-bw/day for dogs	Fitzhugh, et. al., 1964
	Endosulfan I	5.20E-03	5	78-week LOAEL of 0.26 mg/Kg-bw/day for mice / 5 for medium mammals	ATSDR, 1990
	Endosulfan II	5.20E-03	5	78-week LOAEL of 0.26 mg/Kg-bw/day for mice / 5 for medium mammals	ATSDR, 1990
	Endrin	1.70E-01	5, 100	14-day LC50 of 87 mg/Kg-bw/day for short tail shrews / 100 for chronic NOAEL / 5 for medium mammals	Blus, 1978
	Endrin ketone	1.70E-01	5	Small mammal value for Endrin / 5 for medium mammal	Blus, 1978
	gamma-BHC	2.92E+00	1	104-week NOAEL of 2.92 mg/Kg-bw/day for dogs	Rivett, et. al., 1978
	Gamma-chlordane	1.00E+01	1	2-year NOAEL of 0.14 mg/Kg-bw/day for dogs	Eisler, 1990
	Heptachlor	5.70E-01	10	30-day NOAEL of 5.67 mg/Kg-bw/day for mink / 10 for chronic NOAEL	Stickel, et. al., 1956
	Methoxychlor	3.50E+01	1	24-week NOAEL of 35 mg/Kg-bw/day for dogs	Tegeris, et. al., 1966
	Toxaphene	4.16E-03	10, 100	74-day NOAEL of 4.16 mg/Kg-bw/day for pheasants / 10 for chronic NOAEL / 100 for species	Genelly and Rudd, 1956

UNCERTAINTY FACTORS, RATIONALE AND SOURCES, USED TO CALCULATE TOXICITY REFERENCE VALUES
STAR LAKE CANAL SUPERFUND SITE
JEFFERSON COUNTY, TEXAS

REDDISH EGRET

	CONSTITUENTS	TRV	UF	RATIONALE	SOURCE
Metals	Aluminum	7.36E+01	1	4-month NOAEL of 73.6 mg/Kg-bw/day for turtledove	Carriere, et. al., 1985
	Antimony	3.50E-03	100	Small Mammal Life Cycle NOAEL of 0.35 mg/Kg-bw/day	Schroeder, et. al. 1968
	Arsenic	9.30E-01	3, 5	8-week NOAEL of 14 mg/Kg-bw/day for mallards / 3 for chronic NOAEL / 5 for species	Stanley, et. al., 1994
	Barium	1.39E+01	3, 5	4-week NOAEL of 208 mg/Kg-bw/day for chicken / 3 for chronic NOAEL / 5 for species	Sample, et. al,1996
	Beryllium	5.16E-02	5, 100	2-year NOAEL of 25.8 mg/Kg-bw/day for rat divided by 5 for large mammal and by 100 for birds	Morgareidge, et. al., 1977
	Cadmium	2.90E-01	5	90-day NOAEL of 1.45 mg/Kg-bw/day for mallards / 5 for species	White and Finley, 1978
	Chromium VI	5.40E-01	5	5-month NOAEL of 2.71 mg/Kg-bw/day for black ducks / 5 for species	Eisler, 1986
	Cobalt	1.10E+00	3, 5	4-week NOAEL of 16.7 mg/Kg-bw/day for duck / 3 for chronic NOAEL / 5 for species	Van Vleet 1982
	Copper	2.78E+00	3, 10	[4 week NOAEL of 83.3 mg/Kg-bw/day for mallard ducklings*0.1 Kg/day (feed consumption)/ 0.6 Kg (body weight of 4 week old mallard] / 3 chronic NOAEL / 10 inter-taxon variability	Van Vleet 1982
	Lead	4.40E-01	1	12-week NOAEL for mallard duck / 5 inter-taxon variability	Finley et al. 1976
	Manganese	7.30E+00	1	7.3 mg/Kg-bw/day required dose for successful reproduction	Offiong and Abed, 1980
	Mercury	3.50E-02	5	93-day LOAEL of 0.18 mg/Kg-bw/day for great egrets / 5 for NOAEL	Bouton, et. al., 1999
	Nickel	2.59E+01	5	90-day NOAEL of 129.5 mg/Kg-bw/day for mallards / 5 for species	Eastin and O'Shea, 1981
	Selenium	1.00E+00	1	11 - 12 week NOAEL of 1 mg/Kg-bw/day for ducks	Heinz, et. al., 1987
	Silver	5.50E-01	5	4-week NOAEL of 8.3 mg/Kg-bw/day for ducks / 5 for species	Van Vleet 1982
	Vanadium	1.30E-01	5	3-week NOAEL of 0.67 mg/Kg-be /day for chickens / 5 for species	Romoser, et. al., 1961
	Zinc	4.10E+00	5, 5	60-day LOAEL of 125 mg/Kg-bw/day for mallards / 5 for NOAEL / 5 for species	Gasaway and Buss, 1972
	Cyanide (total)	1.43E-02	100	LD50 of 1.43 mg/Kg-bw for mallards / 100 for NOAEL	Eisler, 1991
VOCs	Benzene	1.00E-01	5, 100	103-week NOAEL of 50 mg/Kg-bw/day for rodents / 5 for large mammals / 100 for birds	Huff, et. al., 1989
	Carbon disulfide	1.00E-02	5, 5, 100	10-day NOAEL of 25 mg/Kg-bw/day for rabbits / 5 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR, 1996
	Carbon tetrachloride	3.00E-02	5, 100	2-year NOAEL of 15 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	Alumot, et. al., 1976
	Ethylbenzene	1.00E-01	5	90-day NOAEL of 0.53 mg/Kg-bw/day for quail for hexachlorobenzene / 5 for extrapolation across compounds	Vos, et. al., 1971
	Methyl Tert Butyl Ether	1.80E+00	5, 100	90-day NOAEL of 900 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	Robinson, et. al., 1990
	trans-1,2-Dichloroethene	5.62E+00	5, 100	90-day NOAEL of 2809 mg/Kg-bw/day for mice / 5 large mammals / 100 for birds	Hayes, et. al., 1987
	Xylene	1.00E+00	5, 100	103-week NOAEL of 500 mg/Kg-bw/day for rodents / 5 for large mammals / 100 for birds	ATDSR, 1995
SVOCs	2,4,6-Trichlorophenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	2,4-Dichlorophenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	4-Methylphenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	Biphenyl	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	bis(2-chloroethyl)ether	5.00E-02	5, 100	78-week NOAEL of 25 mg/Kg-bw/day for rats / 5 for medium mammals / 100 for birds	Weisburger, et. al., 1981
	bis(2-ethylhexyl)phthalate	1.02E+01	15, 5	4-week LOAEL of 763 mg/Kg-bw/day for chicken / 15 for chronic NOAEL / 5 for species	Wood and Bitman, 1984
	Carbazole	1.00E-02	100, 5, 100	LDLo of 500 mg/Kg-bw for rats / 100 for chronic NOAEL / 5 for large mammals / 100 for birds	Sax, 1984
	Dibenzofuran	1.02E+00	100	LC50 of >102 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
	Di-n-butylphthalate	1.02E+00	3, 5, 5	4-week LOAEL of 763 mg/Kg-bw/day for chickens / 3 for chronic LOAEL / 5 for chronic NOAEL / 5 for TRV	Wood and Bitman, 1984
	Hexachlorobenzene	1.10E-01	5	90-day NOAEL of 0.53 mg/Kg-bw/day for quail for hexachlorobenzene / 5 for extrapolation across compounds	Vos, et. al., 1971
	Hexachlorobutadiene	1.20E+00	5	90-day NOAEL of 6 mg/Kg-bw/day for quail / 5 for species	Schwetz, et. al., 1974
	N-Nitrosodiphenylamine	1.00E-01	5, 100	100-week NOAEL of 50 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	ATSDR, 1991
	Pentachlorophenol	5.50E+00	5	8-week NOAEL of 27.4 mg/Kg-bw/day for chickens / 5 for species	Prescott, et. al., 1982
PAHs	2-Methylnaphthalene	1.20E+00	5	Naphthalene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Acenaphthene	6.20E+00	5	7-month NOAEL of 30.8 mg/kg-bw for mallards / 5 for species	Patton and Dieter, 1980
	Acenaphthylene	6.20E+00	5	7-month NOAEL of 30.8 mg/kg-bw for mallards / 5 for species	Patton and Dieter, 1980
	Anthracene	2.20E-01	100, 5	LC50 of >111 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL / 5 for species	Schafer, et. al., 1983
	Benzo(a)anthracene	2.00E-04	15, 5, 100	5-week LOAEL of 1.5 mg/Kg-bw/day for mice / 15 for chronic NOAEL / 5 for large mammal / 100 for birds	ATSDR 1993
	Benzo(a)pyrene	1.30E-03	15, 5, 100	9-day LOAEL of 10 mg/Kg-bw/day for mice / 15 for NOAEL / 5 for large mammals / 100 for birds	Mackenzie & Angevine, 1981
	Benzo(b)fluoranthene	8.00E-03	10, 5, 100	chronic carcinogenicity of 40 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 large mammals / 100 for birds	Sims & Overcash, 1983
	Benzo(g,h,i)perylene	3.00E-03	3, 5, 5, 100	9-day LOAEL of 10 mg/Kg-bw/day / 3 chronic LOAEL / 5 NOAEL / 5 medium and large mammals / 100 for birds	Mackenzie & Angevine, 1981
	Benzo(k)fluoranthene	1.44E-02	10, 5, 100	chronic carcinogenicity of 72 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 large mammals / 100 for birds	Sims & Overcash, 1983
	Chrysene	1.98E-02	10, 5, 100	carcinogenicity of 99 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 for large mammals / 100 for birds	Sims & Overcash, 1983
	Dibenz(a,h)anthracene	3.40E-02	3, 5, 100	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Fluoranthene	2.00E-01	5, 5, 100	13-week NOAEL of 500 mg/kg-bw/day for mice / 5 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Fluorene	2.02E-01	100, 5	LC50 of >101 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL / 5 for species	Schafer, et. al., 1983
	Naphthalene	6.20E+00	5	7-month NOAEL of 30.8 mg/Kg-bw/day for mallards / 5 for species	Patton and Dieter, 1980
	Phenanthrene	6.20E+00	5	7-month NOAEL of 30.8 mg/kg-bw for mallards / 5 for species	Patton and Dieter, 1980
	Pyrene	3.43E-01	3, 5, 100	10-day NOAEL of 514 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Total PAHs	5.45E+01	1	[LOAEL of 4000 mg/Kg-bw/day/* 0.15 kg/day (daily consumption of food)/ 1.1 Kg (weight of adult mallard)]/ 10 for chronic NOAEL	Eisler, 1987; Welty, 1982; Terres, 1982
PCBs	Aroclor-1016	1.00E-01	100	247-day NOAEL of 3 mg/Kg-bw/day for mink / 100 for birds	Ringer, et. al., 1981
	Aroclor-1242	1.88E+00	10	12-week LOAEL of 18.75 mg/Kg-bw/day for mallards / 10 for chronic NOAEL	Haseltine and Prouty, 1980
	Aroclor-1248	9.00E-02	5	1.5-year NOAEL of 0.45 mg/Kg-bw/day / 5 for species	McLane and Hughes, 1980
	Aroclor-1254	1.41E+00	1	1.5-year NOAEL of 1.41 mg/kg-bw for mallards	Heath, et. al., 1972
	Aroclor-1260	1.98E+00	100, 10	5-day LC50 for mallards of 1975 mg/Kg-bw / 100 for chronic NOAEL / 10 for species	Heath, et. al., 1972
	Total PCBs	1.34E-04	10, 100	182-day LOAEL of 0.134 mg/Kg-bw/day for mink / 10 for chronic NOAEL / 100 for birds	Heaton et. al., 1995
Pesticides	4,4'-DDE	1.36E+00	1	1.5-year NOAEL of 1.36 mg/Kg-bw/day for ducks	Heath, et. al., 1972
	4,4'-DDT	3.22E+00	500	5-day LC50 of 1612 mg/Kg for mallards / 500 to estimate NOAEL	Van Velsen and Kreitzer, 1975
	Aldrin	1.00E-02	5	7-week NOAEL of 0.05 mg/Kg-bw/day for pheasants / 5 for species	Hall, et. al., 1971
	Alpha-chlordane	8.60E-01	100, 10	5-day LD50 for mallards of 858 mg/Kg-bw / 100 for chronic NOAEL / 10 for species	Eisler, 1990
	beta-BHC	3.00E+00	10	30-day EMLD of 30 mg/Kg-bw/day for mallard / 10 for chronic NOAEL	Hudson, et. al., 1984
	Dieldrin	5.60E-02	5	2-year NOAEL of 0.28 mg/Kg-bw/day for pigeons / 5 for species	Ahmed, et. al., 1978
	Endosulfan I	1.30E-02	100, 5	LD50 of 6.47 mg/Kg for mallards / 100 to estimate NOAEL / 5 for species	Hudson, et. al., 1972
	Endosulfan II	1.30E-02	100, 5	LD50 of 6.47 mg/Kg for mallards / 100 to estimate NOAEL / 5 for species	Hudson, et. al., 1972
	Endrin	1.40E-01	1	6-month NOAEL of 0.14 mg/Kg-bw/day for mallards	Spann, et. al., 1986
	Endrin ketone	1.40E-01	1	6-month NOAEL of 0.14 mg/Kg-bw/day for mallards	Spann, et. al., 1986
	gamma-BHC	1.20E-01	100, 10	96-hour LD50 of 120 mg/Kg-bw for quail / 100 for chronic NOAEL / 10 for species	Dahlen and Haugen 1954
	Gamma-chlordane	8.60E-01	100, 10	5-day LD50 for mallards of 858 mg/Kg-bw / 100 for chronic NOAEL / 10 for species	Eisler, 1990
	Heptachlor	3.60E-01	100, 5	LD50 of 181 mg/kg for American woodcock / 100 to estimate NOAEL / 5 for species	Stickel, et. al., 1956
	Methoxychlor	4.00E+00	500	single dose LC50 for mallards of >2000 mg/Kg-bw / 500 for chronic NOAEL	Hudson, et. al., 1984
	Toxaphene	4.16E-02	10, 10	74-day NOAEL of 4.16 mg/Kg-bw/day for pheasants / 10 for chronic NOAEL / 10 for species	Genelly and Rudd, 1956

UNCERTAINTY FACTORS, RATIONALE AND SOURCES, USED TO CALCULATE TOXICITY REFERENCE VALUES
STAR LAKE CANAL SUPERFUND SITE
JEFFERSON COUNTY, TEXAS

SHORT-TAILED SHREW

	CONSTITUENTS	TRV	UF	RATIONALE	SOURCE
Metals	Aluminum	1.90E+01	1	390-day NOAEL of 19 mg/Kg-bw/day for mice	Ondreicka, et. al., 1966
	Antimony	3.50E-01	1	30-month NOAEL of 0.35 mg/Kg-bw/day for mice	Schroeder, et. al., 1968
	Arsenic	2.35E-01	10	2-year NOAEL of 2.35 mg/Kg-bw/day for dogs / 10 for species	Byron, et. al., 1967
	Barium	6.35E+01	1	92-day NOAEL of 63.5 mg/Kg-bw/day for rats	Dietz, et. al.,1992
	Beryllium	2.58E+01	1	2-year NOAEL of 25.8 mg/Kg-bw/day for rat	Morgareidge, et. al., 1977
	Cadmium	4.00E-01	1	3-year NOAEL of 0.4 mg/Kg-bw/day for mice	Schroeder, et. al., 1964
	Chromium VI	6.60E+00	5	3-month LOAEL of 32.7 mg/Kg-bw/day for rats / 5 for NOAEL	Kanojia, et. al., 1998
	Cobalt	1.67E+00	3	69-day NOAEL of 5 mg/Kg-bw/day for rats / 3 for chronic NOAEL	Nation, et. al., 1983
	Copper	8.47E+00	1	850-day NOAEL of 8.47 mg/Kg-bw/day for mice	Massey and Aiello, 1984
	Lead	9.00E-01	1	9-month NOAEL of 0.9 mg/Kg-bw/day for rats	Grant et. al., 1980, Kimmel et. al., 1980
	Manganese	4.40E+01	1	224-day NOAEL of 44-88 mg/Kg-bw/day for rats	Laskey, et. al., 1982
	Mercury	5.00E-02	1	26-month NOAEL of 0.05 mg/Kg-bw/day for rats	Munro, et. al., 1980
	Nickel	4.75E+01	1	2-year NOAEL of 47.5 mg/Kg-bw/day for rats	Ambrose, et. al., 1976
	Selenium	9.00E-02	5	3 generation LOAEL of 0.45 for mice / 5 for chronic NOAEL	Schroeder & Mitchener, 1971
	Silver	4.44E+01	5	37-week LOAEL of 222.2 mg/Kg-bw/day for rats / 5 for NOAEL	ATSDR, 1990
	Vanadium	2.10E+00	1	60-day NOAEL of 2.1 mg/Kg-bw/day for rats	Domingo, et. al., 1986
	Zinc	3.17E+01	1	13-week NOAEL of 31.7 mg/Kg-bw/day for rats	Maita, et. al., 1981
	Cyanide (total)	1.35E+01	5	11-month LOAEL of 67.5 mg/Kg-bw/day for rats / 5 for NOAEL	Philbrick, et. al., 1979
VOCs	Benzene	5.00E+01	1	103-week NOAEL of 50 mg/Kg-bw/day for rodents	Huff, et. al., 1989
	Carbon disulfide	5.00E+00	5	10-day NOAEL of 25 mg/Kg-bw/day for rabbits / 5 for chronic NOAEL	ATSDR, 1996
	Carbon tetrachloride	1.50E+01	1	2-year NOAEL of 15 mg/Kg-bw/day for rats	Alumot, et. al., 1976
	Ethylbenzene	9.50E+00	500	LD50 of 4769 mg/Kg-bw for rats / 500 for chronic NOAEL	ATDSR, 1999
	Methyl Tert Butyl Ether	9.00E+02	1	90-day NOAEL of 900 mg/Kg-bw/day for rats	Robinson, et. al., 1990
	trans-1,2-Dichloroethene	2.81E+03	1	90-day NOAEL of 2809 mg/Kg-bw/day for mice	Hayes, et. al., 1987
	Xylene	5.00E+02	1	103-week NOAEL of 500 mg/Kg-bw/day for rodents	ATDSR, 1995
SVOCs	2,4,6-Trichlorophenol	6.00E-01	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	ATDSR, 1994
	2,4-Dichlorophenol	6.00E-01	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	ATDSR, 1994
	4-Methylphenol	6.00E-01	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	ATDSR, 1994
	Biphenyl	6.00E-01	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	ATDSR, 1994
	bis(2-chloroethyl)ether	2.50E+01	1	78-week NOAEL of 25 mg/Kg-bw/day for rats	Weisburger, et. al., 1981
	bis(2-ethylhexyl)phthalate	1.32E+01	1	105-day NOAEL of 13.2 mg/Kg-bw/day for mice	Lamb, et. al., 1987
	Carbazole	5.00E+00	100	LDLo of 500 mg/Kg-bw for rats / 100 for chronic NOAEL	Sax, 1984
	Dibenzofuran	1.20E+00	5, 5	103-week LOAEL of 30 mg/Kg-bw for rodents / 5 for chronic NOAEL / 5 for compound extrapolation	ATDSR, 1990
	Di-n-butylphthalate	3.95E+02	1	105-day NOAEL of 395 mg/Kg-bw/day for mice	Lamb, et. al., 1987
	Hexachlorobenzene	2.80E+00	1	2-year NOAEL of 2.80 mg/Kg-bw/day for rats	Grant, et. al., 1977
	Hexachlorobutadiene	2.00E-01	1	2-year and 5-month NOAELs of 0.2 mg/Kg-bw/day for rats	Schwetz, et. al., 1974
	N-Nitrosodiphenylamine	5.00E+01	1	100-week NOAEL of 50 mg/Kg-bw/day for rats	ATSDR, 1991
	Pentachlorophenol	3.00E+00	1	62-day NOAEL of 3 mg/Kg-bw/day for rats	ATDSR, 1994
PAHs	2-Methylnaphthalene	3.66E+01	5	Naphthalene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Acenaphthene	1.71E+01	3	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL	ATSDR, 1993
	Acenaphthylene	3.40E+00	5	Acenaphthene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Anthracene	2.00E+02	5	13-week NOAEL of 1000 mg/Kg-bw/day for mice / 5 for chronic NOAEL	ATSDR, 1995
	Benzo(a)anthracene	1.00E-01	15	5-week LOAEL of 1.5 mg/Kg-bw/day for mice / 15 for chronic NOAEL	ATSDR 1993
	Benzo(a)pyrene	6.70E-01	15	9-day LOAEL of 10 mg/Kg-bw/day for mice / 15 for NOAEL	Mackenzie & Angevine, 1981
	Benzo(b)fluoranthene	4.00E+00	10	chronic carcinogenicity of 40 mg/Kg-bw/day for rodents / 10 for chronic NOAEL	Sims & Overcash, 1983
	Benzo(g,h,i)perylene	1.30E-01	5	Benzo(a)pyrene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Benzo(k)fluoranthene	7.20E+00	10	chronic carcinogenicity of 72 mg/Kg-bw/day for rodents / 10 for chronic NOAEL	Sims & Overcash, 1983
	Chrysene	9.90E+00	10	carcinogenicity of 99 mg/Kg-bw/day for rodents / 10 for chronic NOAEL	Sims & Overcash, 1983
	Dibenz(a,h)anthracene	1.71E+01	3	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL	ATSDR 1995
	Fluoranthene	1.00E+02	5	13-week NOAEL of 500 mg/kg-bw/day for mice / 5 for chronic NOAEL	ATSDR 1995
	Fluorene	1.00E+02	5	13-week NOAEL of 500 mg/kg-bw/day for mice / 5 for chronic NOAEL	ATSDR, 1995
	Naphthalene	1.83E+01	15	90-day NOAEL of 18.3 mg/Kg-bw/day for mice	Shopp, et. al., 1984
	Phenanthrene	1.71E+02	3	10-day NOAEL of 514 mg/Kg-bw/day for rats / 3 for chronic NOAEL	ATSDR, 1995
	Pyrene	1.71E+02	3	10-day NOAEL of 514 mg/Kg-bw/day for rats / 3 for chronic NOAEL	ATSDR 1995
	Total PAHs	1.34E-04	100	22-week NOAEL of 0.71 mg/Kg-bw/day for ducks / 100 for small mammals	Eisler, 1987
PCBs	Aroclor-1016	3.00E-01	10	247-day NOAEL of 3 mg/Kg-bw/day for mink 10 for species	Ringer, et. al., 1981
	Aroclor-1242	4.60E-01	10	36-week NOAEL of 04.6 mg/Kg-bw/day for rats / 10 for chronic NOAEL	Johnsson, et. al., 1976
	Aroclor-1248	2.60E+00	5	5-week LOAEL of 13 mg/Kg-bw/day for mice / 5 for chronic NOAEL	ATDSR, 1991
	Aroclor-1254	3.20E-01	1	2-generation NOAEL of 0.32 mg/Kg-bw/day for rats	Linder, et. al., 1974
	Aroclor-1260	7.40E+00	1	2-generation NOAEL of 7.4 mg/Kg-bw/day for rats	Linder, et. al., 1974
	Total PCBs	7.10E-03	10	182-day LOAEL of 0.134 mg/Kg-bw/day for mink / 10 for chronic NOAEL	Heaton et. al., 1995
Pesticides	4,4'-DDE	1.90E+00	10	78-week LOAEL of 0.84 mg/Kg-bw/day for mice / 10 for chronic NOAEL	NCI, 1978 in ATSDR, 1992
	4,4'-DDT	4.00E-01	1	life span NOAEL of 0.4 mg/Kg-bw/day for mice	Tarjan and Kemeny, 1969
	Aldrin	1.10E-01	1	2-year NOAEL of 0.11 mg/Kg-bw/day for rats	Treon and Cleveland., 1955
	Alpha-chlordane	3.44E+00	1	6-generation NOAEL of 3.44 mg/Kg-bw/day for mice	Eisler, 1990
	beta-BHC	2.80E+00	1	13-week NOAEL of 2.8 mg/Kg-bw/day for rats	Van Velson, et. al., 1986
	Dieldrin	2.40E-01	1	6-generation NOAEL of 0.24 mg/Kg-bw/day for mice	WHO, 1989
	Endosulfan I	2.60E-02	1	78-week LOAEL of 0.26 mg/Kg-bw/day for mice	ATSDR, 1990
	Endosulfan II	2.60E-02	1	78-week LOAEL of 0.26 mg/Kg-bw/day for mice	ATSDR, 1990
	Endrin	8.70E-01	1	14-day LC50 of 87 mg/Kg-bw/day for short tail shrews / 100 for chronic NOAEL	Blus, 1978
	Endrin ketone	8.70E-01	1	Small mammal value for Endrin / 1	Blus, 1978
	gamma-BHC	7.39E+00	1	3-generation NOAEL of 7.39 mg/Kg-bw/day for rats	Palmer, et. al., 1978
	Gamma-chlordane	3.44E+00	1	6-generation NOAEL of 3.44 mg/Kg-bw/day for mice	Eisler, 1990
	Heptachlor	6.00E-01	10	18-month LOAEL of 6 mg/Kg-bw/day for rats / 10 for chronic NOAEL	ATSDR, 1991
	Methoxychlor	2.50E+01	1	11-week NOAEL of 25 mg/Kg-bw/day for rats	Gray, et. al., 1989
	Toxaphene	4.16E-03	10, 100	74-day NOAEL of 4.16 mg/Kg-bw/day for pheasants / 10 for chronic NOAEL / 100 for species	Genelly and Rudd, 1956

APPENDIX I TABLE

UNCERTAINTY FACTORS, RATIONALE AND SOURCES, USED TO CALCULATE TOXICITY REFERENCE VALUES
STAR LAKE CANAL SUPERFUND SITE
JEFFERSON COUNTY, TEXAS

SPOTTED SANDPIPER

	CONSTITUENTS	TRV	UF	RATIONALE	SOURCE
Metals	Aluminum	7.36E+00	1	4-month NOAEL of 73.6 mg/Kg-bw/day for turtledove	Carriere, et. al., 1985
	Antimony	3.50E-03	100	Small Mammal Life Cycle NOAEL of 0.35 mg/Kg-bw/day	Schroeder, et. al. 1968
	Arsenic	9.30E-01	3, 5	8-week NOAEL of 14 mg/Kg-bw/day for mallards / 3 for chronic NOAEL / 5 for species	Stanley, et. al., 1994
	Barium	1.39E+00	10	Used TRV for Ducks and Herons / 10 for small species	Sample, et. al,1996
	Beryllium	5.16E-02	5, 100	2-year NOAEL of 25.8 mg/Kg-bw/day for rat divided by 5 for large mammal and by 100 for birds	Morgareidge, et. al., 1977
	Cadmium	4.20E-03	5, 10	Chicken TRV of 0.21 mg/Kg-bw/day / 5 for species / 10 for UF	Leach, et. al., 1979
	Chromium VI	5.40E-01	5	5-month NOAEL of 2.71 mg/Kg-bw/day for black ducks / 5 for species	Eisler, 1986
	Cobalt	1.10E+00	3, 5	4-week NOAEL of 16.7 mg/Kg-bw/day for duck / 3 for chronic NOAEL / 5 for species	Van Vleet 1982
	Copper	2.78E+00	3, 10	4-week NOAEL of 83.3 mg/Kg-bw/day for duck / 3 for chronic NOAEL / 10 for species	Van Vleet, 1982
	Lead	4.40E-01	5	12-week NOAEL of 2.2 mg/Kg-bw/day for mallards / 5 for species	Finley, et. al., 1976
	Manganese	7.30E+00	1	7.3 mg/Kg-bw/day required dose for successful reproduction	Offiong and Abed, 1980
	Mercury	7.70E-02	5	93-day LOAEL of 0.18 mg/Kg-bw/day for great egrets / 5 for NOAEL	Bouton, et. al., 1999
	Nickel	2.59E+01	5	90-day NOAEL of 129.5 mg/Kg-bw/day for mallards / 5 for species	Eastin and O'Shea, 1981
	Selenium	1.00E-01	1	11 - 12 week NOAEL of 1 mg/Kg-bw/day for ducks	Heinz, et. al., 1987
	Silver	5.50E-01	5	4-week NOAEL of 8.3 mg/Kg-bw/day for ducks / 5 for species	Van Vleet 1982
	Vanadium	1.30E-02	5	3-week NOAEL of 0.67 mg/Kg-be /day for chickens / 5 for species	Romoser, et. al., 1961
	Zinc	4.10E+00	5, 5	60-day LOAEL of 125 mg/Kg-bw/day for mallards / 5 for NOAEL / 5 for species	Gasaway and Buss, 1972
	Cyanide (total)	1.00E-01	100	LD50 of 1.43 mg/Kg-bw for mallards / 100 for NOAEL	Eisler, 1991
VOCs	Benzene	1.00E-01	5, 100	103-week NOAEL of 50 mg/Kg-bw/day for rodents / 5 for large mammals / 100 for birds	Huff, et. al., 1989
	Carbon disulfide	1.00E-02	5, 5, 100	10-day NOAEL of 25 mg/Kg-bw/day for rabbits / 5 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR, 1996
	Carbon tetrachloride	3.00E-02	5, 100	2-year NOAEL of 15 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	Alumot, et. al., 1976
	Ethylbenzene	1.00E-01	5	90-day NOAEL of 0.53 mg/Kg-bw/day for quail for hexachlorobenzene / 5 for extrapolation across compounds	Vos, et. al., 1971
	Methyl Tert Butyl Ether	1.80E+00	5, 100	90-day NOAEL of 900 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	Robinson, et. al., 1990
	trans-1,2-Dichloroethene	5.62E+00	5, 100	90-day NOAEL of 2809 mg/Kg-bw/day for mice / 5 large mammals / 100 for birds	Hayes, et. al., 1987
	Xylene	1.00E+00	5, 100	103-week NOAEL of 500 mg/Kg-bw/day for rodents / 5 for large mammals / 100 for birds	ATDSR, 1995
SVOCs	2,4,6-Trichlorophenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	2,4-Dichlorophenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	4-Methylphenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	Biphenyl	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	bis(2-chloroethyl)ether	5.00E-02	5, 100	78-week NOAEL of 25 mg/Kg-bw/day for rats / 5 for medium mammals / 100 for birds	Weisburger, et. al., 1981
	bis(2-ethylhexyl)phthalate	1.02E+01	15, 5	4-week LOAEL of 763 mg/Kg-bw/day for chicken / 15 for chronic NOAEL / 5 for species	Wood and Bitman, 1984
	Carbazole	1.00E-02	100, 5, 100	LDLo of 500 mg/Kg-bw for rats / 100 for chronic NOAEL / 5 for large mammals / 100 for birds	Sax, 1984
	Dibenzofuran	1.02E+00	100	LC50 of >102 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
	Di-n-butylphthalate	4.45E-01	3, 5, 10	30-day NOAEL of 66.7 mg/Kg-bw/day for starlings / 3 for chronic NOAEL / 5 for compound extrapolation / 10 for species	O'Shea and Stafford, 1980
	Hexachlorobenzene	1.10E-01	5	90-day NOAEL of 0.53 mg/Kg-bw/day for quail for hexachlorobenzene / 5 for extrapolation across compounds	Vos, et. al., 1971
	Hexachlorobutadiene	1.20E+00	5	90-day NOAEL of 6 mg/Kg-bw/day for quail / 5 for species	Schwetz, et. al., 1974
	N-Nitrosodiphenylamine	1.00E-01	5, 100	100-week NOAEL of 50 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	ATSDR, 1991
	Pentachlorophenol	5.50E+00	5	8-week NOAEL of 27.4 mg/Kg-bw/day for chickens / 5 for species	Prescott, et. al., 1982
PAHs	2-Methylnaphthalene	1.20E+00	5	Naphthalene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Acenaphthene	6.20E+00	5	7-month NOAEL of 30.8 mg/kg-bw for mallards / 5 for species	Patton and Dieter, 1980
	Acenaphthylene	6.20E+00	1	Used TRV value for Acenaphthene	Neff 1979; Sims & Overcash, 1983
	Anthracene	2.20E-01	100, 5	LC50 of >111 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL / 5 for species	Schafer, et. al., 1983
	Benzo(a)anthracene	2.00E-04	15, 5, 100	5-week LOAEL of 1.5 mg/Kg-bw/day for mice / 15 for chronic NOAEL / 5 for large mammal / 100 for birds	ATSDR 1993
	Benzo(a)pyrene	1.30E-03	15, 5, 100	9-day LOAEL of 10 mg/Kg-bw/day for mice / 15 for NOAEL / 5 for large mammals / 100 for birds	Mackenzie & Angevine, 1981
	Benzo(b)fluoranthene	8.00E-03	10, 5, 100	chronic carcinogenicity of 40 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 large mammals / 100 for birds	Sims & Overcash, 1983
	Benzo(g,h,i)perylene	3.00E-04	5	Benzo(a)pyrene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Benzo(k)fluoranthene	1.44E-02	10, 5, 100	chronic carcinogenicity of 72 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 large mammals / 100 for birds	Sims & Overcash, 1983
	Chrysene	1.98E-02	10, 5, 100	carcinogenicity of 99 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 for large mammals / 100 for birds	Sims & Overcash, 1983
	Dibenz(a,h)anthracene	3.40E-02	3, 5, 100	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Fluoranthene	2.00E-01	5, 5, 100	13-week NOAEL of 500 mg/Kg-bw/day for mice / 5 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Fluorene	2.02E-01	100, 5	LC50 of >101 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL / 5 for species	Schafer, et. al., 1983
	Naphthalene	6.20E+00	5	7-month NOAEL of 30.8 mg/Kg-bw/day for mallards / 5 for species	Patton and Dieter, 1980
	Phenanthrene	6.20E+00	5	7-month NOAEL of 30.8 mg/kg-bw for mallards / 5 for species	Patton and Dieter, 1980
	Pyrene	3.43E-01	3, 5, 100	10-day NOAEL of 514 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Total PAHs	5.45E+01	1	[LOAEL of 4000 mg/Kg-bw/day/* 0.15 kg/day (daily consumption of food)/ 1.1 Kg (weight of adult mallard)]/ 10 for chronic NOAEL	Eisler, 1987; Welty, 1982; Terres, 1982
PCBs	Aroclor-1016	3.00E-02	100	247-day NOAEL of 3 mg/Kg-bw/day for mink / 100 for birds	Ringer, et. al., 1981
	Aroclor-1242	1.88E-01	10	12-week LOAEL of 18.75 mg/Kg-bw/day for mallards / 10 for chronic NOAEL	Haseltine and Prouty, 1980
	Aroclor-1248	9.00E-02	5	1.5-year NOAEL of 0.45 mg/Kg-bw/day / 5 for species	McLane and Hughes, 1980
	Aroclor-1254	1.41E-01	10	1.5-year NOAEL of 1.41 mg/kg-bw for mallards	Heath, et. al., 1972
	Aroclor-1260	1.98E+00	100, 10	5-day LC50 for mallards of 1975 mg/Kg-bw / 100 for chronic NOAEL / 10 for species	Heath, et. al., 1972
	Total PCBs	1.34E-04	10, 100	182-day LOAEL of 0.134 mg/Kg-bw/day for mink / 10 for chronic NOAEL / 100 for birds	Heaton et. al., 1995
Pesticides	4,4'-DDE	1.36E-01	10	1.5-year NOAEL of 1.36 mg/Kg-bw/day for ducks / 10 for species	Heath, et. al., 1972
	4,4'-DDT	3.22E+00	500	5-day LC50 of 1612 mg/Kg for mallards / 500 to estimate NOAEL	Van Velsen and Kreitzer, 1975
	Aldrin	1.00E-02	5	7-week NOAEL of 0.05 mg/Kg-bw/day for pheasants / 5 for species	Hall, et. al., 1971
	Alpha-chlordane	8.60E-02	100, 10, 10	5-day LD50 for mallards of 858 mg/Kg-bw / 100 for chronic NOAEL / 10 for species	Eisler, 1990
	beta-BHC	3.00E+00	10	30-day EMLD of 30 mg/Kg-bw/day for mallard / 10 for chronic NOAEL	Hudson, et. al., 1984
	Dieldrin	5.60E-02	5	2-year NOAEL of 0.28 mg/Kg-bw/day for pigeons / 5 for species	Ahmed, et. al., 1978
	Endosulfan I	1.30E-02	100, 5	LD50 of 6.47 mg/Kg for mallards / 100 to estimate NOAEL / 5 for species	Hudson, et. al., 1972
	Endosulfan II	1.30E-02	100, 5	LD50 of 6.47 mg/Kg for mallards / 100 to estimate NOAEL / 5 for species	Hudson, et. al., 1972
	Endrin	1.40E-02	10	6-month NOAEL of 0.14 mg/Kg-bw/day for mallards / 10 for species	Spann, et. al., 1986
	Endrin ketone	1.40E-02	10	6-month NOAEL of 0.14 mg/Kg-bw/day for mallards / 10 for species	Spann, et. al., 1986
	gamma-BHC	1.20E-01	100, 10	96-hour LD50 of 120 mg/Kg-bw for quail / 100 for chronic NOAEL / 10 for species	Dahlen and Haugen 1954
	Gamma-chlordane	8.60E-02	100, 10	5-day LD50 for mallards of 858 mg/Kg-bw / 100 for chronic NOAEL / 10 for species	Eisler, 1990
	Heptachlor	3.60E-01	100, 5	LD50 of 181 mg/kg for American woodcock / 100 to estimate NOAEL / 5 for species	Stickel, et. al., 1956
	Methoxychlor	3.75E+01	100	5-day NOAEL of 3750 mg/Kg-bw/day for robins / 100 UF	Hunt and Sacho, 1969
	Toxaphene	4.16E-02	10, 10	74-day NOAEL of 4.16 mg/Kg-bw/day for pheasants / 10 for chronic NOAEL / 10 for species	Genelly and Rudd, 1956

UNCERTAINTY FACTORS, RATIONALE AND SOURCES, USED TO CALCULATE TOXICITY REFERENCE VALUES
STAR LAKE CANAL SUPERFUND SITE
JEFFERSON COUNTY, TEXAS

WHITE-FACED IBIS

	CONSTITUENTS	TRV	UF	RATIONALE	SOURCE
Metals	Aluminum	7.36E+01	1	4-month NOAEL of 73.6 mg/Kg-bw/day for turtledove	Carriere, et. al., 1985
	Antimony	3.50E-03	100	Small Mammal Life Cycle NOAEL of 0.35 mg/Kg-bw/day	Schroeder, et. al. 1968
	Arsenic	9.30E-01	3, 5	8-week NOAEL of 14 mg/Kg-bw/day for mallards / 3 for chronic NOAEL / 5 for species	Stanley, et. al., 1994
	Barium	1.39E+01	3, 5	4-week NOAEL of 208 mg/Kg-bw/day for chicken / 3 for chronic NOAEL / 5 for species	Sample, et. al,1996
	Beryllium	5.16E-02	5, 100	2-year NOAEL of 25.8 mg/Kg-bw/day for rat divided by 5 for large mammal and by 100 for birds	Morgareidge, et. al., 1977
	Cadmium	2.90E-01	5	90-day NOAEL of 1.45 mg/Kg-bw/day for mallards / 5 for species	White and Finley, 1978
	Chromium VI	5.40E-01	5	5-month NOAEL of 2.71 mg/Kg-bw/day for black ducks / 5 for species	Eisler, 1986
	Cobalt	1.10E+00	3, 5	4-week NOAEL of 16.7 mg/Kg-bw/day for duck / 3 for chronic NOAEL / 5 for species	Van Vleet 1982
	Copper	1.80E+00	10	40-week NOAEL of 18 mg/Kg-bw/day for domestic chicken / 10 for species	Jackson and Stevenson 1981
	Lead	4.40E-01	1	12-week NOAEL of 2.2 mg/Kg-bw/day for mallards / 5 for species	Finley, et. al., 1976
	Manganese	7.30E+00	1	7.3 mg/Kg-bw/day required dose for successful reproduction	Offiong and Abed, 1980
	Mercury	3.50E-02	5	93-day LOAEL of 0.18 mg/Kg-bw/day for great egrets / 5 for NOAEL	Bouton, et. al., 1999
	Nickel	2.59E+01	5	90-day NOAEL of 129.5 mg/Kg-bw/day for mallards / 5 for species	Eastin and O'Shea, 1981
	Selenium	1.00E+00	1	11 - 12 week NOAEL of 1 mg/Kg-bw/day for ducks	Heinz, et. al., 1987
	Silver	5.50E-01	5	4-week NOAEL of 8.3 mg/Kg-bw/day for ducks / 5 for species	Van Vleet 1982
	Vanadium	1.30E-01	5	3-week NOAEL of 0.67 mg/Kg-be /day for chickens / 5 for species	Romoser, et. al., 1961
	Zinc	4.10E+00	5, 5	60-day LOAEL of 125 mg/Kg-bw/day for mallards / 5 for NOAEL / 5 for species	Gasaway and Buss, 1972
	Cyanide (total)	1.43E-02	100	LD50 of 1.43 mg/Kg-bw for mallards / 100 for NOAEL	Eisler, 1991
VOCs	Benzene	1.00E-01	5, 100	103-week NOAEL of 50 mg/Kg-bw/day for rodents / 5 for large mammals / 100 for birds	Huff, et. al., 1989
	Carbon disulfide	1.00E-02	5, 5, 100	10-day NOAEL of 25 mg/Kg-bw/day for rabbits / 5 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR, 1996
	Carbon tetrachloride	3.00E-02	5, 100	2-year NOAEL of 15 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	Alumot, et. al., 1976
	Ethylbenzene	1.00E-01	5	90-day NOAEL of 0.53 mg/Kg-bw/day for quail for hexachlorobenzene / 5 for extrapolation across compounds	Vos, et. al., 1971
	Methyl Tert Butyl Ether	1.80E+00	5, 100	90-day NOAEL of 900 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	Robinson, et. al., 1990
	trans-1,2-Dichloroethene	5.62E+00	5, 100	90-day NOAEL of 2809 mg/Kg-bw/day for mice / 5 large mammals / 100 for birds	Hayes, et. al., 1987
	Xylene	1.00E+00	5, 100	103-week NOAEL of 500 mg/Kg-bw/day for rodents / 5 for large mammals / 100 for birds	ATDSR, 1995
SVOCs	2,4,6-Trichlorophenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	2,4-Dichlorophenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	4-Methylphenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	Biphenyl	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	bis(2-chloroethyl)ether	5.00E-02	5, 100	78-week NOAEL of 25 mg/Kg-bw/day for rats / 5 for medium mammals / 100 for birds	Weisburger, et. al., 1981
	bis(2-ethylhexyl)phthalate	1.02E+01	15, 5	4-week LOAEL of 763 mg/Kg-bw/day for chicken / 15 for chronic NOAEL / 5 for species	Wood and Bitman, 1984
	Carbazole	1.00E-02	100, 5, 100	LDLo of 500 mg/Kg-bw for rats / 100 for chronic NOAEL / 5 for large mammals / 100 for birds	Sax, 1984
	Dibenzofuran	1.02E+00	100	LC50 of >102 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
	Di-n-butylphthalate	1.02E+00	3, 5, 5	4-week LOAEL of 763 mg/Kg-bw/day for chickens / 3 for chronic LOAEL / 5 for chronic NOAEL / 5 for TRV	Wood and Bitman, 1984
	Hexachlorobenzene	1.10E-01	5	90-day NOAEL of 0.53 mg/Kg-bw/day for quail for hexachlorobenzene / 5 for extrapolation across compounds	Vos, et. al., 1971
	Hexachlorobutadiene	1.20E+00	5	90-day NOAEL of 6 mg/Kg-bw/day for quail / 5 for species	Schwetz, et. al., 1974
	N-Nitrosodiphenylamine	1.00E-01	5, 100	100-week NOAEL of 50 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	ATSDR, 1991
	Pentachlorophenol	5.50E+00	5	8-week NOAEL of 27.4 mg/Kg-bw/day for chickens / 5 for species	Prescott, et. al., 1982
PAHs	2-Methylnaphthalene	1.20E+00	1	Naphthalene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Acenaphthene	6.20E+00	5	7-month NOAEL of 30.8 mg/kg-bw for mallards / 5 for species	Patton and Dieter, 1980
	Acenaphthylene	6.20E+00	5	7-month NOAEL of 30.8 mg/kg-bw for mallards / 5 for species	Patton and Dieter, 1980
	Anthracene	2.20E-01	100, 5	LC50 of >111 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL / 5 for species	Schafer, et. al., 1983
	Benzo(a)anthracene	2.00E-04	100, 5	LC50 of >111 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL / 5 for species	Schafer, et. al., 1983
	Benzo(a)pyrene	1.30E-03	15, 5, 100	5-week LOAEL of 1.5 mg/Kg-bw/day for mice / 15 for chronic NOAEL / 5 for large mammal / 100 for birds	ATSDR 1993
	Benzo(b)fluoranthene	8.00E-03	15, 5, 100	9-day LOAEL of 10 mg/Kg-bw/day for mice / 15 for NOAEL / 5 for large mammals / 100 for birds	Mackenzie & Angevine, 1981
	Benzo(g,h,i)perylene	3.00E-04	10, 5, 100	chronic carcinogenicity of 40 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 large mammals / 100 for birds	Sims & Overcash, 1983
	Benzo(k)fluoranthene	1.44E-02	5	Benzo(a)pyrene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Chrysene	9.90E-01	10, 10	chronic carcinogenicity of 72 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 10 for birds	Sims & Overcash, 1983
	Dibenz(a,h)anthracene	3.40E-02	3, 5, 100	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Fluoranthene	2.00E-01	5, 5, 100	13-week NOAEL of 500 mg/Kg-bw/day for mice / 5 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Fluorene	2.02E-01	100, 5	LC50 of >101 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL / 5 for species	Schafer, et. al., 1983
	Naphthalene	6.20E+00	5	7-month NOAEL of 30.8 mg/Kg-bw/day for mallards / 5 for species	Patton and Dieter, 1980
	Phenanthrene	6.20E+00	5	7-month NOAEL of 30.8 mg/kg-bw for mallards / 5 for species	Patton and Dieter, 1980
	Pyrene	3.43E-01	3, 5, 100	10-day NOAEL of 514 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Total PAHs	7.10E-01	1	22-week NOAEL of 0.71 mg/Kg-bw/day for ducks	Stubblefield, et. al., 1995
PCBs	Aroclor-1016	3.00E-02	100	247-day NOAEL of 3 mg/Kg-bw/day for mink / 100 for birds	Ringer, et. al., 1981
	Aroclor-1242	1.88E+00	10	12-week LOAEL of 18.75 mg/Kg-bw/day for mallards / 10 for chronic NOAEL	Haseltine and Prouty, 1980
	Aroclor-1248	9.00E-02	5	1.5-year NOAEL of 0.45 mg/Kg-bw/day / 5 for species	McLane and Hughes, 1980
	Aroclor-1254	1.41E+00	1	1.5-year NOAEL of 1.41 mg/kg-bw for mallards	Heath, et. al., 1972
	Aroclor-1260	1.34E-04	10, 100	182-day LOAEL of 0.134 mg/Kg-bw/day for mink / 10 for chronic NOAEL / 100 for birds	Heaton et. al., 1995
	Total PCBs	1.98E+00	100, 10	5-day LC50 for mallards of 1975 mg/Kg-bw / 100 for chronic NOAEL / 10 for species	Heath, et. al., 1972
Pesticides	4,4'-DDE	1.36E+00	1	1.5-year NOAEL of 1.36 mg/Kg-bw/day for ducks	Heath, et. al., 1972
	4,4'-DDT	3.22E+00	500	5-day LC50 of 1612 mg/Kg for mallards / 500 to estimate NOAEL	Van Velsen and Kreitzer, 1975
	Aldrin	1.00E-02	5	7-week NOAEL of 0.05 mg/Kg-bw/day for pheasants / 5 for species	Hall, et. al., 1971
	Alpha-chlordane	8.60E-01	100, 10	5-day LD50 for mallards of 858 mg/Kg-bw / 100 for chronic NOAEL /for birds	Eisler, 1990
	beta-BHC	3.00E+00	10	30-day EMLD of 30 mg/Kg-bw/day for mallard / 10 for chronic NOAEL	Hudson, et. al., 1984
	Dieldrin	5.60E-02	5	2-year NOAEL of 0.28 mg/Kg-bw/day for pigeons / 5 for species	Ahmed, et. al., 1978
	Endosulfan I	1.30E-02	100, 5	LD50 of 6.47 mg/Kg for mallards / 100 to estimate NOAEL / 5 for species	Hudson, et. al., 1972
	Endosulfan II	1.30E-02	100, 5	LD50 of 6.47 mg/Kg for mallards / 100 to estimate NOAEL / 5 for species	Hudson, et. al., 1972
	Endrin	1.40E-01	1	6-month NOAEL of 0.14 mg/Kg-bw/day for mallards	Spann, et. al., 1986
	Endrin ketone	1.40E-01	1	6-month NOAEL of 0.14 mg/Kg-bw/day for mallards	Spann, et. al., 1986
	gamma-BHC	1.20E-01	100, 10	96-hour LD50 of 120 mg/Kg-bw for quail / 100 for chronic NOAEL / 10 for species	Dahlen and Haugen 1954
	Gamma-chlordane	8.60E-02	100, 10	5-day LD50 for mallards of 858 mg/Kg-bw / 100 for chronic NOAEL	Eisler, 1990
	Heptachlor	3.60E-01	100, 5	LD50 of 181 mg/kg for American woodcock / 100 to estimate NOAEL / 5 for species	Stickel, et. al., 1956
	Methoxychlor	4.00E+00	500	single dose LC50 for mallards of >2000 mg/Kg-bw / 500 for chronic NOAEL	Hudson, et. al., 1984
	Toxaphene	4.16E-02	10, 10	74-day NOAEL of 4.16 mg/Kg-bw/day for pheasants / 10 for chronic NOAEL / 10 for species	Genelly and Rudd, 1956

APPENDIX I TABLE

UNCERTAINTY FACTORS, RATIONALE AND SOURCES, USED TO CALCULATE TOXICITY REFERENCE VALUES
STAR LAKE CANAL SUPERFUND SITE
JEFFERSON COUNTY, TEXAS

WOOD STORK

	CONSTITUENTS	TRV	UF	RATIONALE	SOURCE
Metals	Aluminum	7.36E+01	1	4-month NOAEL of 73.6 mg/Kg-bw/day for turtledove	Carriere, et. al., 1985
	Antimony	3.50E-03	100	Small Mammal Life Cycle NOAEL of 0.35 mg/Kg-bw/day	Schroeder, et. al. 1968
	Arsenic	9.30E-01	3, 5	8-week NOAEL of 14 mg/Kg-bw/day for mallards / 3 for chronic NOAEL / 5 for species	Stanley, et. al., 1994
	Barium	1.39E+01	3, 5	4-week NOAEL of 208 mg/Kg-bw/day for chicken / 3 for chronic NOAEL / 5 for species	Sample, et. al,1996
	Beryllium	5.16E-02	5, 100	2-year NOAEL of 25.8 mg/Kg-bw/day for rat divided by 5 for large mammal and by 100 for birds	Morgareidge, et. al., 1977
	Cadmium	2.90E-01	5	90-day NOAEL of 1.45 mg/Kg-bw/day for mallards / 5 for species	White and Finley, 1978
	Chromium VI	5.40E-01	5	5-month NOAEL of 2.71 mg/Kg-bw/day for black ducks / 5 for species	Eisler, 1986
	Cobalt	1.10E+00	3, 5	4-week NOAEL of 16.7 mg/Kg-bw/day for duck / 3 for chronic NOAEL / 5 for species	Van Vleet 1982
	Copper	2.78E+00	3, 10	[4 week NOAEL of 83.3 mg/Kg-bw/day for mallard ducklings*0.1 Kg/day (feed consumption)/ 0.6 Kg (body weight of 4 week old mallard] / 3 chronic NOAEL / 10 inter-taxon variability	Van Vleet 1982
	Lead	4.40E-01	1	12-week NOAEL for mallard duck / 5 inter-taxon variability	Finley et al. 1976
	Manganese	7.30E+00	1	7.3 mg/Kg-bw/day required dose for successful reproduction	Offiong and Abed, 1980
	Mercury	3.50E-02	5	93-day LOAEL of 0.18 mg/Kg-bw/day for great egrets / 5 for NOAEL	Bouton, et. al., 1999
	Nickel	2.59E+01	5	90-day NOAEL of 129.5 mg/Kg-bw/day for mallards / 5 for species	Eastin and O'Shea, 1981
	Selenium	1.00E+00	1	11 - 12 week NOAEL of 1 mg/Kg-bw/day for ducks	Heinz, et. al., 1987
	Silver	5.50E-01	5	4-week NOAEL of 8.3 mg/Kg-bw/day for ducks / 5 for species	Van Vleet 1982
	Vanadium	1.30E-01	5	3-week NOAEL of 0.67 mg/Kg-be /day for chickens / 5 for species	Romoser, et. al., 1961
	Zinc	4.10E+00	5, 5	60-day LOAEL of 125 mg/Kg-bw/day for mallards / 5 for NOAEL / 5 for species	Gasaway and Buss, 1972
	Cyanide (total)	1.00E-01	100	LD50 of 1.43 mg/Kg-bw for mallards / 100 for NOAEL	Eisler, 1991
VOCs	Benzene	1.00E-01	5, 100	103-week NOAEL of 50 mg/Kg-bw/day for rodents / 5 for large mammals / 100 for birds	Huff, et. al., 1989
	Carbon disulfide	1.00E-02	5, 5, 100	10-day NOAEL of 25 mg/Kg-bw/day for rabbits / 5 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR, 1996
	Carbon tetrachloride	3.00E-02	5, 100	2-year NOAEL of 15 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	Alumot, et. al., 1976
	Ethylbenzene	1.00E-01	5	90-day NOAEL of 0.53 mg/Kg-bw/day for quail for hexachlorobenzene / 5 for extrapolation across compounds	Vos, et. al., 1971
	Methyl Tert Butyl Ether	1.80E+00	5, 100	90-day NOAEL of 900 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	Robinson, et. al., 1990
	trans-1,2-Dichloroethene	5.62E+00	5, 100	90-day NOAEL of 2809 mg/Kg-bw/day for mice / 5 large mammals / 100 for birds	Hayes, et. al., 1987
	Xylene	1.00E+00	5, 100	103-week NOAEL of 500 mg/Kg-bw/day for rodents / 5 for large mammals / 100 for birds	ATDSR, 1995
SVOCs	2,4,6-Trichlorophenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	2,4-Dichlorophenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	4-Methylphenol	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	Biphenyl	1.10E+00	5	Pentachlorophenol TRV / 5 for extrapolation across compounds	Prescott, et. al., 1982
	bis(2-chloroethyl)ether	5.00E-02	5, 100	78-week NOAEL of 25 mg/Kg-bw/day for rats / 5 for medium mammals / 100 for birds	Weisburger, et. al., 1981
	bis(2-ethylhexyl)phthalate	1.02E+01	15, 5	4-week LOAEL of 763 mg/Kg-bw/day for chicken / 15 for chronic NOAEL / 5 for species	Wood and Bitman, 1984
	Carbazole	1.00E-02	100, 5, 100	LDLo of 500 mg/Kg-bw for rats / 100 for chronic NOAEL / 5 for large mammals / 100 for birds	Sax, 1984
	Dibenzofuran	1.02E+00	100	LC50 of >102 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL	Schafer, et. al., 1983
	Di-n-butylphthalate	1.02E+00	3, 5, 5	4-week LOAEL of 763 mg/Kg-bw/day for chickens / 3 for chronic LOAEL / 5 for chronic NOAEL / 5 for TRV	Wood and Bitman, 1984
	Hexachlorobenzene	1.10E-01	5	90-day NOAEL of 0.53 mg/Kg-bw/day for quail for hexachlorobenzene / 5 for extrapolation across compounds	Vos, et. al., 1971
	Hexachlorobutadiene	1.20E+00	5	90-day NOAEL of 6 mg/Kg-bw/day for quail / 5 for species	Schwetz, et. al., 1974
	N-Nitrosodiphenylamine	1.00E-01	5, 100	100-week NOAEL of 50 mg/Kg-bw/day for rats / 5 for large mammals / 100 for birds	ATSDR, 1991
	Pentachlorophenol	5.50E+00	5	8-week NOAEL of 27.4 mg/Kg-bw/day for chickens / 5 for species	Prescott, et. al., 1982
PAHs	2-Methylnaphthalene	1.20E+00	5	Naphthalene TRV / 5 for PAH extrapolation	Neff 1979; Sims & Overcash, 1983
	Acenaphthene	6.20E+00	5	7-month NOAEL of 30.8 mg/kg-bw for mallards / 5 for species	Patton and Dieter, 1980
	Acenaphthylene	6.20E+00	5	7-month NOAEL of 30.8 mg/kg-bw for mallards / 5 for species	Patton and Dieter, 1980
	Anthracene	2.20E-01	100, 5	LC50 of >111 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL / 5 for species	Schafer, et. al., 1983
	Benzo(a)anthracene	2.00E-04	15, 5, 100	5-week LOAEL of 1.5 mg/Kg-bw/day for mice / 15 for chronic NOAEL / 5 for large mammal / 100 for birds	ATSDR 1993
	Benzo(a)pyrene	1.30E-03	15, 5, 100	9-day LOAEL of 10 mg/Kg-bw/day for mice / 15 for NOAEL / 5 for large mammals / 100 for birds	Mackenzie & Angevine, 1981
	Benzo(b)fluoranthene	8.00E-03	10, 5, 100	chronic carcinogenicity of 40 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 large mammals / 100 for birds	Sims & Overcash, 1983
	Benzo(g,h,i)perylene	3.00E-03	3, 5, 5, 100	9-day LOAEL of 10 mg/Kg-bw/day / 3 chronic LOAEL / 5 NOAEL / 5 medium and large mammals / 100 for birds	Mackenzie & Angevine, 1981
	Benzo(k)fluoranthene	1.44E-02	10, 5, 100	chronic carcinogenicity of 72 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 large mammals / 100 for birds	Sims & Overcash, 1983
	Chrysene	1.98E-02	10, 5, 100	carcinogenicity of 99 mg/Kg-bw/day for rodents / 10 for chronic NOAEL / 5 for large mammals / 100 for birds	Sims & Overcash, 1983
	Dibenz(a,h)anthracene	3.40E-02	3, 5, 100	10-day NOAEL of 51.4 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Fluoranthene	2.00E-01	5, 5, 100	13-week NOAEL of 500 mg/kg-bw/day for mice / 5 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Fluorene	2.02E-01	100, 5	LC50 of >101 mg/Kg-bw for red-winged blackbird / 100 to estimate chronic NOAEL / 5 for species	Schafer, et. al., 1983
	Naphthalene	6.20E+00	5	7-month NOAEL of 30.8 mg/Kg-bw/day for mallards / 5 for species	Patton and Dieter, 1980
	Phenanthrene	6.20E+00	5	7-month NOAEL of 30.8 mg/kg-bw for mallards / 5 for species	Patton and Dieter, 1980
	Pyrene	3.43E-01	3, 5, 100	10-day NOAEL of 514 mg/Kg-bw/day for rats / 3 for chronic NOAEL / 5 for large mammals / 100 for birds	ATSDR 1995
	Total PAHs	5.45E+01	1	[LOAEL of 4000 mg/Kg-bw/day/* 0.15 kg/day (daily consumption of food)/ 1.1 Kg (weight of adult mallard)] / 10 for chronic NOAEL	Eisler, 1987; Welty, 1982; Terres, 1982
PCBs	Aroclor-1016	3.00E-02	100	247-day NOAEL of 3 mg/Kg-bw/day for mink / 100 for birds	Ringer, et. al., 1981
	Aroclor-1242	1.88E+00	10	12-week LOAEL of 18.75 mg/Kg-bw/day for mallards / 10 for chronic NOAEL	Haseltine and Prouty, 1980
	Aroclor-1248	9.00E-02	5	1.5-year NOAEL of 0.45 mg/Kg-bw/day / 5 for species	McLane and Hughes, 1980
	Aroclor-1254	1.41E+00	1	1.5-year NOAEL of 1.41 mg/kg-bw for mallards	Heath, et. al., 1972
	Aroclor-1260	1.98E+00	100, 10	5-day LC50 for mallards of 1975 mg/Kg-bw / 100 for chronic NOAEL / 10 for species	Heath, et. al., 1972
	Total PCBs	1.34E-04	10, 100	182-day LOAEL of 0.134 mg/Kg-bw/day for mink / 10 for chronic NOAEL / 100 for birds	Heaton et. al., 1995
Pesticides	4,4'-DDE	1.36E+00	1	1.5-year NOAEL of 1.36 mg/Kg-bw/day for ducks	Heath, et. al., 1972
	4,4'-DDT	3.22E+00	500	5-day LC50 of 1612 mg/Kg for mallards / 500 to estimate NOAEL	Van Velsen and Kreitzer, 1975
	Aldrin	1.00E-02	5	7-week NOAEL of 0.05 mg/Kg-bw/day for pheasants / 5 for species	Hall, et. al., 1971
	Alpha-chlordane	8.60E-01	100, 10	5-day LD50 for mallards of 858 mg/Kg-bw / 100 for chronic NOAEL	Eisler, 1990
	beta-BHC	3.00E+00	10	30-day EMLD of 30 mg/Kg-bw/day for mallard / 10 for chronic NOAEL	Hudson, et. al., 1984
	Dieldrin	5.60E-02	5	2-year NOAEL of 0.28 mg/Kg-bw/day for pigeons / 5 for species	Ahmed, et. al., 1978
	Endosulfan I	1.30E-02	100, 5	LD50 of 6.47 mg/Kg for mallards / 100 to estimate NOAEL / 5 for species	Hudson, et. al., 1972
	Endosulfan II	1.30E-02	100, 5	LD50 of 6.47 mg/Kg for mallards / 100 to estimate NOAEL / 5 for species	Hudson, et. al., 1972
	Endrin	1.40E-01	1	6-month NOAEL of 0.14 mg/Kg-bw/day for mallards	Spann, et. al., 1986
	Endrin ketone	1.40E-01	1	6-month NOAEL of 0.14 mg/Kg-bw/day for mallards	Spann, et. al., 1986
	gamma-BHC	1.20E-01	100, 10	96-hour LD50 of 120 mg/Kg-bw for quail / 100 for chronic NOAEL / 10 for species	Dahlen and Haugen 1954
	Gamma-chlordane	8.60E-01	100, 10	5-day LD50 for mallards of 858 mg/Kg-bw / 100 for chronic NOAEL	Eisler, 1990
	Heptachlor	3.60E-01	100, 5	LD50 of 181 mg/kg for American woodcock / 100 to estimate NOAEL / 5 for species	Stickel, et. al., 1956
	Methoxychlor	4.00E+00	500	single dose LC50 for mallards of >2000 mg/Kg-bw / 500 for chronic NOAEL	Hudson, et. al., 1984
	Toxaphene	4.16E-02	10, 10	74-day NOAEL of 4.16 mg/Kg-bw/day for pheasants / 10 for chronic NOAEL / 10 for species	Genelly and Rudd, 1956

Notes:

EMLD - Empirical Minimum Lethal Dose
LC50 - Lethal Concentration for 50% of population
LD50 - Lethal Dose for 50% of population
LDLo - Lowest Lethal Dose tested
LOAEL - Lowest Observed Adverse Effect Level
NOAEL - No Observed Adverse Effect Level
PAHs - Polycyclic Aromatic Hydrocarbons
PCBs - Polychlorinated Biphenyls
SVOCs - Semi-Volatile Organic Compounds
TRV - Toxicity Reference Value
UF - Uncertainty Factor(s) applied to calculate TRV
VOCs - Volatile Organic Compounds